

insects
29

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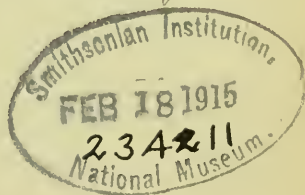
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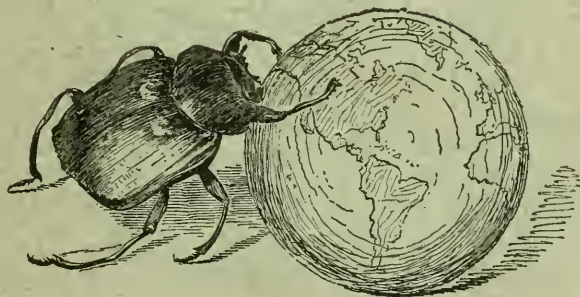
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No. 1

A TABLE OF THE GENERA OF NOCTUIDÆ OF NORTHEASTERN NORTH AMERICA.

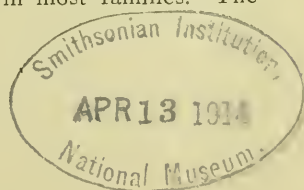
By WM. T. M. FORBES,

WORCESTER, MASS.

As the last general view of our Noctuid genera, published by J. B. Smith in the Bulletin of the Brooklyn Entomological Society, is now obsolete, a new synopsis of them, even for a limited fauna, will prove useful.

The Noctuidæ may be defined as moths with simple or pectinate antennæ, with regularly tapering shaft, with labial palpi developed and maxillary palpi, in our species, rudimentary. Ocelli always present, and rarely covered with scales. Fore wing with one developed anal vein, with cubitus apparently four-branched, R_3 and R_4 never arising separately from the cell. Hind wing with two developed anals, with a strong frenulum, simple in the male, usually of three bristles in the female. Sc and R arising separately at the base, the base of Sc curved and moderately thickened, not sending a brace across to the base of the frenulum; the two veins more or less completely fused for a short distance, the fusion commencing less than a fifth way out on the cell and very rarely extending beyond the middle.

The characters used in dividing the genera are drawn from all parts, but the venation is of less value than in most families. The



size and vestiture of the palpi is much used but they are movable and caution must therefore be used. The basal joint varies a little in size but gives no good characters. The second may be either straight or upturned, in the latter case it is concave on the upper side, enabling the character to be used, even in dead specimens where the palpus has fallen forward. The third joint varies in size and vestiture, but its position is generally unimportant. Where statements are given of the relation of it to the vertex it is understood as applying in the position taken in life, with the second joint closely applied to the frontal vestiture, and the third erect or recurved.

The maxillary palpi can only be seen when the labial palpi are removed; in the Acronyctinæ and many Quadrifidæ they are easily seen from in front; in the Noctuinæ they are smaller, and covered by the pilifer, or rudimentary mandible, and its bristles; they are attached to the sides of the base of the tongue.

The tongue is considered as rudimentary when shorter than the thorax. Such tongues are also weak and slender, and may be recognized with a little practice without uncoiling.

The vestiture is the covering of hair and scales, and the characters here used are drawn from the top of the thorax. It is of five principal types: (1) scales, broad to the base, then narrowing abruptly to the knob that fits in a socket in the skin; (2) spatulate scales, and short spatulate hairs, formed of a broad end, attached by a hair-like base some three or four times its length, or in most cases many times its length. In these cases the scale-like tips may be imbricated and give the appearance of simple scales; (3) flattened hairs, in which the broadened part is many times as long as wide; and (4) simple hair, which is not flattened at all, but occasionally ends in a minute blunt or bifid tip. Besides these main types *Eriopus* shows a very long scale, which tapers gradually to the base, and many Pachnobiæ have deeply forked bifid or trifid hairs that seem simple until pulled out.

The legs almost always show a fringe of hair on the femora, easily rubbed off in most of the slender species, and the tibiæ also are roughly hairy in the stout kinds, but this is not considered in these tables unless forming a mass larger than the tibia itself or capable of fanlike expansion.

The tufting of the body is much used. The noticeable hair arises

from the following parts: the collar or tegulæ, a pair of loose pieces forming the front quarter of the dorsum of the thorax; the patagia or patagiæ lying over the base of the wings, and curving down in front of them; the mesothorax or disc of the thorax lying between them, and the metathorax or narrow posterior ridge, extending out under the tips of the patagia to the base of the hind wings. The principle tufts usually on the front and back of the mesothorax the last sometimes combining with a mass of hair on the metathorax.

The abdomen has a series of tufts on the middle line in many cases, the first of which is usually larger than the second.

The tympanic opening lies at each side of the first segment of the abdomen, behind the base of the hind wings, sometimes it is covered by a flap of scales. There is usually a slit, often concealing a pencil of hair, just above it.

It should be noted that all the Noctuidæ have spines on the under side of the tarsi, the outer and inner of these form a regular row on each side, while those in the middle line are irregular and vary individually. In many Agrotids there is a fourth row toward the upper outer side of the tarsus usually of only four or five spines. *Catabapta* also has this fourth row.

I should be very grateful for additions and corrections to this table, and especially for information as to any characters that can be used to separate the genera related to *Hadena*, *Mamestra*, *Xylina*, and the female Deltoids.

- | | |
|--|----------------------|
| 1. Eyes hairy | 2. |
| Eyes naked (without hair arising from the eyeball) | 28. |
| 2. Venation of hind wing quadrifid (1) | 3. |
| Trifid | 5. |
| 3. Palpi reaching to middle of front or rather beyond; tuft on basal joint of antenna scaly | <i>Charadra</i> (2). |
| Palpi very short and hairy, the second joint shorter than width of eye, tuft on antenna hairy | 4. |
| 4. Female antennæ simple, fore wing with decided W-mark in subterminal line, orbicular a dot or absent | <i>Panthea</i> (2). |
| Female antennæ serrate below, fore wing with st. line only a little irregular, orbicular a ring | <i>Demas</i> (2). |
| 5. Fore tibia with a strong claw at the tip, very short | <i>Barathra</i> . |
| Fore tibia normal, unarmed | 6. |
| 6. Eyes about half the width of the front, and oval | <i>Anarta</i> (3). |
| Eyes about as wide as the front | 7. |

7. Hair on the thorax all erect, bristling, and with spoon-shaped tips,
Xanthopastis (4).
Vestiture rarely erect and bristling, and if so with the tips not enlarged 8.
8. With a high conical tuft on vertex, eyes lashed *Stretchia*.
No conical tuft between antennæ 9
9. Eyes strongly lashed in front as well as behind 10.
Eyes not lashed in front, and weakly if at all behind 11.
10. Vestiture loose, hairy *Lasiestra* (5).
Vestiture normal, mixed *Xylomiges*.
11. Thorax with fine hairy vestiture, and abdomen with strong normal tuft-
ing *Nephelodes*.
With coarser vestiture or nearly untufted abdomen 12.
12. Female antennæ pectinate (wings usually less than twice as long as wide,
thorax with a pyramidal crest in front, often with contrasting white
reniform *Tricholita*.
Female, and often male, antennæ simple; wings usually more than twice
as long as wide, thorax rarely with pyramidal crest; rarely with a
contrasting white mark in reniform 13.
13. Abdomen with several dorsal tufts 14.
Abdomen with a single basal tuft or none 15.
14. Fore wing with R_3 and R_4 stalked more than halfway from tip of accessory
cell to apex, with strongly oblique outer margin *Morrisonia* (6).
Fore wing with R_3 and R_4 shortly stalked, with more erect outer margin,
Mamestra (7).
15. Vestiture of simple hair, no tufts whatever .. *Leucania* (typical) (8) (9).
Vestiture of narrow strap-shaped flattened hair; mostly rather slender
species, longitudinally striate *Leucania* group *Borolia* (8).
Vestiture mixed, of various widths of serrate flattened hair, or if almost
entirely of hair with distinct basal abdominal tuft 16.
16. Front rough and projecting half the width of the eyes or with heavy
spines on outer side of first joint (metatarsus) of fore tarsus,
Mamestra (7).
Front smooth, not projecting more than a third the width of the eyes,
spining of fore tarsus normal 17.
17. Abdomen with a more or less distinct basal tuft 18.
Abdomen wholly untufted 22.
18. Fore wing oblong, the anal angle so retracted that the part of the outer
margin from Cu_2 to A is parallel to the base of the costa,
Crocigrapa (10).
Fore wing broadening more toward outer margin, the anal angle less
retracted, the margin between the tips of Cu_2 and A, belonging dis-
tinctly to the outer margin 19.
19. M_1 of hind wing stalked with R about a fifth way to the margin, wings
long and narrow, powdery, hind wing notched opposite cell *Xylomiges*.
 M_1 free, from cell or obscurely stalked 20.

20. Vestiture mainly flattened, feathery; frontal tuft smooth, overhanging; our species mouse-gray *Ulolonche* (Hyssia).
Vestiture mainly of fine hair, or with divided frontal tuft, larger and heavier 21.
21. With a distinct series of larger spatulate-tipped hairs on the inner side of the patagia, which are usually black and conspicuous, vestiture usually lying flat, basal tuft very slight; transverse posterior line reduced to dots or absent, st. indicated at most by a change of color, wings often acute *Leucania*, group *Cirphis* (8).
Vestiture almost wholly of hair, loose, with a slight double tuft, basal tuft of abdomen almost obsolete, markings complete. Usually dull brown or silvery gray *Taniocampa* (11).
Vestiture variable, usually with a fairly even proportion of hair and feathery flattened hair, loose, basal tuft often strong, our species mostly yellowish or reddish *Mamestra* in part (7).
22. Male with rough raised scales or hair on underside of fore wing,
Orthodes (12).
Both sexes alike with only a little loose long hair on under side of wings *Taniocampa* (*Himella*) (11).
23. Middle tibiæ, at least, spinulated 24.
Tibiæ not spinulated, or at most with one or two spines on the hind tibia, the male often with extremely heavy tibial tufting, which is rare in the spinulated group 63.
24. Hind wing *quadrid* 25.
Hind wing *trifid* 41.
25. Eyes small, legs loosely hairy and entire vestiture of rough hair.
Euclidia (13).
Eyes moderate, nearly or quite as wide as the front 26.
26. Thorax with a strong longitudinal dorsal crest *Celiptera*.
Thorax with smooth vestiture, or anterior and posterior tufts 27.
27. Fore tibiæ spined on front side (the spines easily visible without denuding) (14) 28.
Fore tibiæ unarmed 29.
28. Fore wing lanceolate, hind tarsus very slender, palpi beaklike and extending twice the length of the head *Doryodes*.
Fore wing with blunt apex, truncate between R_3 and R_4 ; palpi closely upturned to near vertex, tarsi normal *Catocala*, group *Catabapta*.
29. Hind tibiæ spined between the spurs (14) 30.
Hind tibiæ unarmed, or with a couple of spines only near the top and often concealed in the vestiture 35.
30. Abdomen with more or less developed basal tufts, usually in the form of raised ridges of loose hair on the three basal segments; hind wing largely black, the ground color often bright red or yellow,
Catocala in part (15).
Abdomen smoothly scaled, or with vestiture somewhat raised at base, not forming distinct ridges, hind wing broadly marked with black only in *Andrewsia* 31.

31. Upper part of hind tibia with a series of spines 32.
 Hind tibia with no spines above upper spurs 34.
32. Palpi with third joint half as long as second, fore wing with subfalcate apex and even outer margin, cell of hind wing a third length of wing 33.
 Palpi with third joint a third as long as second, fore wing with blunt apex and more wavy outer margin, cell of hind wing two-fifths length of wing *Drasteria* (16).
33. Male with a fringe of long hair on hind tarsus, hind wing banded, *Remigia*.
 Male tarsi normal, hind wing with dark outer third, and pale t. p. line only or wholly plain *Phrurys* (17).
34. Thorax tufted behind, third joint of palpi long; fore wing with complex markings, hind wing fuscous *Campometra*.
 Thorax wholly smooth, palpus with third joint short, hind wing yellow and fuscous *Catocala* group *Andrewsia*.
 Thorax smooth, palpus with third joint short, body more slender, wings pale fuscous and both marked similarly *Spiloloma* (*Strenoloma*).
35. Hind wing black or broadly marked with black, fore wing with complex markings, thorax without massive posterior tuft and elevated patagia, three basal segments of abdomen with raised ridges of rough hair forming more or less distinct tufts on the middle line.. *Catocala* (15).
 Hind wing not black, unless the fore wing is also, abdomen with tufts usually either sharply defined or absent 36.
36. Abdomen with strong and strongly unequal tufts, markings usually similar on both wings *Phaocyma* (19).
 Abdomen smooth, or with a basal tuft only, sometimes followed by a little loose hair on the next two segments 37.
37. Fore wing with marked subfalcate apex 38.
 Fore wing with bluntly rounded apex and sometimes wavy margin .. 40.
38. Male with normal mid-tibia, outer line of fore wing even, and nearly parallel to outer margin *Parallclia*.
 Outer line angulate, its distinctest (upper) portion perpendicular to costa, male with much swollen mid-tibia; palpi with shorter third joint 39.
39. Third joint of palpus stubby *Agnomonina*.
 Third joint of palpus slender *Grammodes* (20).
40. Thorax overlaid with broad spatulate scales *Matigramma*.
 Thorax overlaid with fine hair *Poaphila*.

Trifida with spinulated tibiae.

41. Fore tibiae with a single terminal claw *Adita*.
 Fore tibiae with several claws or spines 42.
 Fore tibiae unarmed 59.
42. Front rough with a distinct raised ring, or truncate elliptical projection, *Euxoa* (21).
 Front merely rough and prominent, or smooth 43.

43. Ees half as wide as front, front rough 44.
 Eyes with the facettèd part about two-thirds as wide as the front,
Heliothis (ononis).
 Eyes about as wide as the front 45.
44. Fore tibia about four times as long as wide, with moderate spines,
Agrotiphila.
 Fore tibia about 3 times as long as wide, with two pairs of heavy
 terminal claws *Melaporphyria* (22).
 Fore tibia about twice as long as wide, with heavy claws.... *Heliothana.*
45. Tongue rudimentary, much shorter than thorax; front rough, but fairly
 flat, fore tibiæ about twice as long as wide, with one terminal claw
 about half as long as itself *Eucoptocnemis.*
 Tongue functional, or with lightly spined fore tibiæ 46.
46. Front rough and granular, dull, strongly rounded out, fore tibia normally
 with heavy claws or spines 47.
 Front shining and rarely projecting more than a third the width of the
 eyes; fore tibiæ slender and usually with light spines 55.
47. Mid-, and hind-metatarsi without an upper row of spinules 48.
 Metatarsi with several subdorsal outer spinules, forming a sparse fourth
 row *Feltia* (21).
48. Fore tibia with two inner and three to five outer claws,
Lygranthacia (23).
 Fore tibia with a single inner terminal claw much longer than the pre-
 ceding spines, the outer not much larger than the preceding ones,
 which are graded in size 49.
- Fore tibia with both inner and outer claws several times as large as the
 immediately preceding spines, or with only these two claws 52.
49. Abdomen with conspicuous basal tuft 50.
 Abdomen with basal dorsal tuft absent or covered by the thoracic
 vestiture 51.
50. Fore wing violet (in the Mississippi valley species),
Dasyspoudax (24).
- Fore wing red or orange *Rhododipsa.*
51. Vestiture overlaid with hair, wings pink and straw yellow,
Rhodophora (Alaria).
 Vestiture rough, with anterior and posterior tufts, or with imbricate
 spatulate scales, rarely pink and yellow *Schinia* (25).
52. With the two end-claws only, or with one or two spinules; male with
 distorted venation and hyaline streaks on fore wing,
Heliocheilus (26).
- With several spinules on fore tibia, male normal 53.
53. Fore tibia two and a half times as long as wide 54.
 Fore tibia much more slender *Heliothis* (with *Chloridea*).
54. Hind wing contrastingly marked *Eupanychis.*
 Hind wing all dull yellow-brown *Schinia (saturata).*
55. Palpi upturned to vertex, wings large, broad, with even outer margin,
 tongue weak *Pteroscia.*

- Palpi upturned to middle of front or porrect 56.
56. Vestiture deeply overlaid with plain or forked hair 57.
- Vestiture flattened or mixed 58.
57. Tongue weak, shorter than thorax; wings broad and thin, with even outer margin, resembling *Pteroscia*, metatarsi with three rows of spinules *Choëphora* (28).
- Tongue normal, wings smaller and heavy, metatarsi often with four rows of spinules *Pachnobia* (*Episilia*) (21).
58. Spinulation of fore tibia strong, or if weak and concealed in the vestiture (*baja*), with strongly flattened body *Noctua* (21).
- Spinulation concealed in vestiture, body rather slender and cylindrical, wings broad, with arched costa; largely arctic,
- Eurois* group *Aplectoïdes* (21).
59. Abdomen strongly tufted, eyes more or less lashed 60.
- Abdomen untufted 61.
60. Thorax with fine feathery spatulate vestiture, wings normal, our species light gray *Anytus*.
- Vestiture of flattened hair, wings more lanceolate, our species black,
- Fishia*.
61. Spines of tarsus regular, eyes not lashed *Eurois* (21).
- Eyes distinctly lashed 62.
62. Vestiture mixed, largely spatulate *Apharetra*.
- Vestiture of rough hair, spinules of tarsus distinctly in four well spaced rows, but all four rows are ventral *Ufeus*.
63. Fore wing without accessory cell 64.
- Accessory cell present, rarely reduced or stalked, and still more rarely open at tip, leaving R_2 stalked with R_3 and R_4 with R_6 79.
64. M_2 of hind wing wholly absent (legs normal) 65.
- Normal trifidæ with M_2 very weak, though tubular, and from a third to two fifths way up the cell; legs normal; Sc and R of hind wing fused to middle of cell 67.
- M_2 as strong as most veins, from a quarter way up the cell; front smooth, palpi long, male with legs often modified 69.
65. Front rough and prominent with strongly projecting clypeus, palpi rather short, hardly reaching middle of front when upturned, fore wings rather narrow, R_2 free, from cell, Sc and R of hind wings with long fusion 66.
- Front smooth, palpi upturned beyond vertex, with long third joint, wings broad *Cobubatha* (*Tripudia*) *quadrifera*.
66. Yellow and fuscous, markings simple *Heliocentia* (29).
- Yellow, red and black, markings complex *Spragueia*.
67. Front rough and strongly projecting, the palpi barely extending beyond it,
- Tarache* group *Tarachidia* (aberrant specimens).
- Front smooth, the palpi if upturned reaching vertex 68.
68. Palpi upturned to vertex, close-scaled, the third joint upturned, front with large smooth imbricate scaling *Menopsinus* (30).

- Palpi porrect, with triangularly scaled second, and porrect concealed third joint, wings broader *Rivula*.
69. Palpi rather closely scaled, upturned to vertex or above 70.
- Palpi with first joint very long, third recurved over head and thorax, bearing a pencil of long hair *Palthis* ♂.
- Palpi projecting beak-like about the length of the thorax, with blade-like second and broadly scaled third joint, or rarely (*Renia salusalis* ♂) shorter with a pencil on inner side 73.
70. Two radials (R_3 and R_4) stalked, male antennæ pectinate.... *Melanomma*.
Three or four radials stalked, antennæ various, rarely pectinate 71.
71. R_2 free and well separated from the stalk, occasionally stalked with R_1 ,
Hyperstrotia (31).
- R_2 stalked, in *Tetanolita* shortly, with R_{3+4} 72.
72. Palpi upturned about to vertex, male with normal antennæ and fore legs, antennæ simple, R_5 free *Ozarba* (32).
Palpi upturned to twice height of head, recurved; male antennæ with a scale-tuft a third way out, and fore legs with large pencils of hair; R_5 well stalked *Tetanolita*.
73. Fore wing cleft at middle of outer margin..... *Gaberasa* ♂.
Fore wing with a hyaline spot, falcate with angled outer margin,
Dercetis.
- Fore wing opaque, obscurely angled or rounded 74.
74. Males,—frenulum simple, fore legs strongly modified 75.
Females,—frenulum of three bristles, fore legs normal 76.
75. Antennæ with a knot and claws near middle *Renia*.
Antennæ normal *Heterogramma*.
76. Fore wing more than twice as long as wide, folded in repose.... *Palthis*.
Fore wing less than twice as long as wide, normally not folded in repose 77.
77. R_2 stalked, outer edge of fore wing only slightly sinuous or bent.. 78.
 R_2 from cell, outer edge of fore wing distinctly angulated *Gaberasa*.
78. Normally brown or blackish *Renia*.
Light grayish luteous, with olivaceous markings *Heterogramma*.
79. *Expanse over four inches*; front smooth, with a vertical ridge, very narrow 80.
Expanse under three inches, front without a long vertical ridge 81.
80. Dark brown, male hind metatarsus with a double fringe of long dense-set bristles, hind wing bent *Erebus*.
80. Pale gray and brown, male metatarsus normal; hind wings scalloped,
Thysania.
81. *Fore tibia with a claw* at tip, the legs otherwise normal 82.
Fore tibia unarmed except for the usual epiphysis on the inner side, or else (Deltoids) strongly modified, with large fan-like tufts 90.
82. Front with a raised ring 83.
Front at most rough and prominent 87.
83. The ring produced into a point below 84.
The ring regular and even 85.

84. Apex of fore wing acute *Stiria*.
 Apex of fore wings bluntly rounded *Cirrhophanus*.
85. Fore tibia with two claws *Plagiomimicus*.
 Fore tibia with one claw 86.
86. Bright golden, outer margin of fore wing bent *Basilodes*.
 Dull olivaceous, outer margin more evenly curved *Stibadium*.
87. Small, vestiture of short, spatulate scales, eyes not lashed, three claws
 on tibia *Derrima*.
 Fairly large, vestiture deep, eyes lashed, one or two claws on tibia ... 88.
88. Vestiture of regularly imbricated spatulate scales, fore tibia with two
 claws *Lepipolys*.
 Vestiture mixed, feathery, with fine flattened hair dominant 89.
 Vestiture of fine flattened hair and hair, tongue weak, fore tibia with a
 strong claw and a flattened leaf-like process *Eutotype*.
 Vestiture of simple rough hair *Copipanolis*.
89. Claw very strong, a small leaf-like process beside it, tongue weak,
Psaphida (Dicopis).
 Claw slender, no leaf-like process, tongue normal *Oncocnemis*.
90. *Front with a specialized prominence, or conically prominent as a*
whole 91.
 Front smooth or rough, and merely rounded out 96.
91. Process long, pyramidal, with concave faces and three or four sharp
 lateral crests *Nonagria (Archanara)* (33).
 Process with a raised ring at extremity *Endryas*.
 Process a sharp cone in middle of front, the edges of the front flat.. 92.
 Front conical as a whole, but with the tip of the cone truncate; small
 scaly moths *Xanthoptera* (34).
 Front conical as a whole 95.
92. Eyes half as wide as front; very hairy *Psychomorpha*.
 Eyes moderate 93.
93. Tongue weak; abdomen with several crests *Achatodes*.
 Tongue rather stronger, abdomen with one crest or none 94.
94. Abdomen with a basal crest, wings normal *Xanthacia* (35).
 Abdomen untufted, wings lanceolate *Senta* (36).
95. Antennæ pectinate in both sexes, eyes naked *Sphida* (37).
 Antennæ simple in both sexes, eyes lashed *Brachycosmia* (38).
96. *Quadrifida with strongly lashed eyes* 97.
 Eyes not lashed in front, or with normal trifid venation (39) 101.
97. Fore wing strongly angulate, especially on M_3 *Scoliopteryx*.
 Fore wing with rounded outer margin, but with a strong lobe and scale-
 tooth at middle of inner margin *Calpe*.
 Fore wing with at most a scale-tooth at anal angle 98.
98. Palpi projecting obliquely or straight forward about twice the length
 of the head 99.
 Palpi closely upturned, or moderate in length 100.
99. Lashes loose, well-developed with spatulate tips; fore wing with acute
 apex, and outer margin curving regularly into inner *Phiprosopus*.

- Lashes short, inconspicuous and simple, anal angle well-marked, and often scale-tufted. HYPENINI 175.
100. Markings in part of raised black scales *Abrostola*.
Wings smoothly scaled *Plusia* (40).
101. Fore metatarsus with some enlarged spines on outer side, these spines about as long as width of tarsus (trifidæ) 102.
Fore tarsus normal 104.
102. Eyes naked in front, obscurely lashed behind *Rhodacia* (41).
Eyes strongly lashed 103.
103. Vestiture of fine hair, male antennæ pectinate *Psectraglæa* (42).
Vestiture somewhat mixed, male antennæ not pectinate *Harpaglæa* (43).
104. Hind wing twice as wide as the very narrow fore wing, and triangular, *Magusa*.
Fore wing proportionately broader, and hind wing not triangular 105.
105. Collar hood-like, movable, forming a high crest when turned back and projecting over head when turned forward 106.
Collar moderate in size and not strikingly movable 107.
106. Eyes lashed strongly, wings lanceolate, vestiture deep and hairy. *Cucullia*.
Eyes naked, vestiture more scaly *Catabena*.
107. Hind wing translucent white except at margin and veins; wings long; palpi upturned and closely appressed, thorax with mixed vestiture, smooth in front, but with a strong divided or spreading tuft behind 108.
Hind wing opaque; or otherwise of entirely different structure 109.
108. Abdomen with several tufts, the first large and hood-shaped.. *Prodenia*.
Abdomen with small basal tuft only *Laphygma*.
109. Fore wing distinctly angulate at M_3 and sometimes strongly so and irregular 110.
Fore wing with outer margin perfectly even, slightly concave below apex and above anal angle,—these angles both acute, orbicular with slightly raised white scales *Alabama* (44).
Fore wing with margin often wavy and sometimes slightly bent, but never angled at M_3 or with even outer margin and acute anal angle 117.
110. Eyes heavily lashed *Eucirrhædia*.
Eyes not distinctly lashed 111.
111. Orbicular marked by a small but distinct raised white tuft *Anomis*.
Orbicular not marked by a raised white dot 112.
112. A small hyaline dot. Outer margin nearly even, except for the angle at M_3 and falcate apex; palpi beak-like *Dercetis*.
No hyaline dot 113.
113. Anal angle strongly scale-tufted *Eriopus* (45).
Anal angle not marked by a scale-tuft 114.

114. Palpi slender and upturned well beyond vertex, wings broad 115.
 Palpi stouter and not reaching vertex, fore wings more than twice as long as wide and irregularly angulate 116.
115. Slender, both wings thin and irregularly angled *Pangrapta*.
 The fore wing only with an angle on M_3 , which is often slight; stouter, *Isogona*.
116. Trifid, female frenulum triple *Brotolomia* (46).
 Quadrifid, female frenulum simple *Eutelia*.
117. With a long lobe and scale-tuft at middle of inner margin *Plusiodonta*.
 With a distinct scale-tuft at anal angle only, our species orange and silver *Eriopus* (45).
 Without a scale-tuft on inner margin 118.
118. One vein of hind wing wholly absent (47) 119.
 Hind wing with M_2 present, though often a mere thickened line, and M_3 free or short-stalked with Cu_1 122.
 M_2 strong, M_3 stalked with Cu_1 more than half-way to margin, *Sarrothripus* (48).
119. Vestiture deep, of narrow strap-shaped scales *Fagitana*.
 Vestiture scaly 120.
120. Palpi short, hardly exceeding the rough and protuberant front. *Spragueia*.
 Palpi upturned to vertex 121.
121. Palpi with curved slender second joint. Fore wing with Cu_2 strongly curved at base, hind wing with Sc and R fused to middle of cell, *Characoma* (49).
 Palpi with straight second joint, somewhat blade-like. Fore wing with Cu_2 straight, Sc and R of hind wing with short fusion near base, *Galgula*.
122. A pair of loose tufts of bright yellow spatulate scales on mesothorax, and a similar tuft on middle of abdomen *Cerma* (50).
 Mesothorax with low tufts, similar to those behind, or none 123.
123. Eyes less than half as wide as front, nearly buried in hairy lashes, *Sympistis*.
 Eyes more than half as wide as front or not lashed 124.
124. Abdomen with several dorsal tufts 125.
 Abdomen with a single basal tuft or none, rarely with a second very slight tuft, or, especially in species with strongly lashed eyes, with loose dorsal hairs on the following segments 152.
125. Abdomen with the crests behind middle larger than those in front and with a massive crest at middle; a massive posterior thoracic crest, *Harrisimemna*.
 Abdomen with dorsal tufts becoming weak or absent on posterior half 126.

126. Anterior tuft of thorax high, truncate at tip, often lying back along the thorax, the true posterior tuft slight or wanting 127.
 Anterior tuft not much higher than posterior, or pyramidal 129.
127. Trifidæ; palpi extending barely to vertex, male antennæ simple in our species 128.
 Venation intermediid; palpi extending far above vertex; male antennæ pectinate *Hypsoropha*.
128. Vestiture very fine and wooly, largely of hair *Papaipema* (51).
 Vestiture mainly of imbricated spatulate scales *Ogdoconta* (52).
129. Vestiture of simple scales; palpi if upturned reaching vertex, if porrect the second joint fairly long, front smooth and fairly flat 130.
 Vestiture of simple scales, front rough and strongly rounded out, hardly exceeded by the palpi 131.
 Vestiture of spatulate scales or deeper 132.
130. Typical trifid a few species of *Hadena*.
 M_2 fairly strong and tubular, M_3 sometimes stalked; *ldcv.* decidedly stronger than *mdcv.* and meeting it at an angle,
Lithacodia (*Eustrotia*) (53).
131. Tuft on one middle abdominal segment very strong *Chamyris*.
 Abdominal tufts moderate, and the two largest, at least, subequal,
Tarache (54).
132. Front strongly rounded out and rough, vestiture of short spatulate scales 133.
 Front smooth, and not strongly projecting unless perfectly smooth and shining 134.
133. Tufts on one middle abdominal segment very strong *Chamyris*.
 Tufts on third and fourth segments of abdomen practically equal, a fan-shaped basal tuft on abdomen *Bryocodia* (55).
134. Eyes decidedly narrower than front 135.
 Eyes as wide as front or wider 136.
135. Vestiture almost scaly, eyes naked, wings stumpy,
Eustrotia ? *inclusens* (56).
 Vestiture of rough hair, eyes strongly lashed, wings long, body stout,
Feralia (57).
136. Palpi with straight blade-like second joint, projecting for more than the length of the head beyond it. *HYPENINI* 175.
 Palpi shorter or not beak-like 137.
137. Quadrifid; fore wing more than twice as long as wide, female frenulum with at most two bristles, tympanic opening covered by a peculiar flap of scales, base of abdomen with a transverse ridge of scales,
Marasmalus.
 Normal trifid, or if M_2 is low and fairly strong in hind wing, with much broader hind wings; tympanic opening rarely closed by a scale-flap, female frenulum triple 138.
138. Fore wing with marked subfalcate apex and even outer margin (58) 139.
 Fore wing with blunt apex and more or less wavy outer margin 142.

139. Slender, with short spatulate-scaly vestiture, no tufts, made with fovea on disc of fore wing *Amyna* (59).
 Stout, with deep vestiture and a central ridge on thorax 140.
140. Eyes strongly lashed *Jodia* (60).
 Eyes naked, at least in front 141.
141. Palpi upturned beyond vertex, thorax with central ridge sharp and striking *Pyrrhia* (61).
 Palpi somewhat shorter, central ridge of thorax diffuse or rarely (erepta) divided *Apamea*.
142. Fore and hind wings with similar complex markings, resting with wings spread; slender with slender palpi upturned rather beyond vertex; quadrifid *Metalectra* (62).
 Quadrifid, hind wing plain, palpi short *Raphia*.
 Trifid 143.
143. Edge of patagiæ and under side of palpi rough-scaled only, vestiture of deep spatulate scales and hair 144.
 Some loose hair on edge of patagiæ and lower side of second joint of palpus, or vestiture almost scaly 145.
144. Tuft on third segment of abdomen very large *Euplexia*.
 Tufts on third and fourth segments of abdomen subequal,
Trigonophora (63).
145. Palpi with long third, and closely scaled, upturned second joint, the third joint when upturned reaching vertex *Perigea* (64).
 Palpi shorter or with blade-like or clavate second joint 146.
146. Tibiæ with massive tufts *Delta* (65).
 Tibiæ fringed with hair, or evenly scaled 147.
147. Vestiture of short spatulate scales, not decidedly tufted on thorax; palpi upturned to vertex *Bryocodia* (55).
 Vestiture deep, or with strong thoracic tufts 148.
148. Median area contrasting, brown, bounded by the ordinary lines, which meet at inner margin *Conserzula* (66).
 Ordinary lines, if distinct, not meeting at inner margin 149.
149. Thoracic vestiture almost flat dorsally, feathery, not decidedly tufted, markings characteristic *Hyppa* (66).
 Thoracic vestiture well rounded up dorsally, often scaly, almost hairy, or with well-marked tufts when feathery 150.
150. Eyes lashed, front with strong tuft, divided longitudinally and transversely 151.
 Eyes not often lashed, never heavily, front with loose, fine, or rough vestiture *Hadena*, etc. (66).
151. Fore wing with strongly arched costa, about twice as long as wide
Xylotype (67).
 Fore wing with costa nearly straight, and nearly parallel to inner margin,
Xylina.

Abdomen not strongly tufted.

152. Front only half as wide as eyes and rough; basal tuft of abdomen fan-like; vestiture of short spatulate scales, palpi upturned beyond middle of front 153.
 Front projecting half the width of the eyes, broad, rough; palpi beak-like *Balsa*.
 Similar, vestiture scaly, palpi not exceeding the clypeus.. *Tarache* (54).
 Front fairly broad, rarely strongly rounded out (*e. g.*, some *Acronyctas* and *Bellura*); smooth and shining 154.
153. Anterior thoracic crest large and fan-like *Leuconycta* (68).
 Anterior thoracic crest slight *Polygrammate*.
154. Abdomen very stout and broadly flattened; palpi closely scaled and upturned beyond vertex; eyes not lashed.... *Amphipyra* (*Pyrophila*).
 Abdomen rarely strongly flattened and if so with lashed eyes or moderate palpi or both 155.
155. Bright lemon yellow *Xanthia*.
 Ground color green 156.
 Of other colors, often ochre or pale straw-yellow 157.
156. Fore wings twice as long as wide, eyes lashed *Feralia*, group *Momaphana*.
 Fore wing normal, eyes naked *Agriopodes* (69).
157. Vestiture of plain hair, smooth on abdomen and wholly without tufts, fore wing more or less striate, or without distinct markings 158.
 Otherwise, vestiture very rarely of plain hair 159.
158. Tongue very weak, maxillary palpi distinct *Arsilonche*.
 Tongue normal, maxillary palpi concealed by the pilifer in front view, *Ommatostola*.
159. Vestiture of short spatulate scales or simple scales; palpi large, if upturned reaching vertex, eyes very rarely lashed 160.
 Vestiture deep and mixed, palpi usually moderate 180.
160. Mesothorax with well-marked paired tufts between the posterior ends of the patagia, vestiture decidedly spatulate 161.
 Mesothorax usually smoothly, sometimes roughly, scaled but only with divided tufts in a few species with vestiture of normal scales .. 162.
161. Abdomen with a fan-like tuft at base, fore wing not striate, maxillary palpi larger *Acronycta* group *fragilis* (*Microcalia*) (68).
 Abdomen with slight basal tuft or none, fore wing brown, striate; maxillary palpi smaller *Crambodes*.
162. Palpi if upturned barely exceeding vertex, and with moderate, smoothly scaled third joint, or shorter; if porrect, extending about the length of the head 163.
 Palpi if upturned with a long third joint, usually at least half the length of the second, far exceeding the vertex, and when shortest rough-scaled or hairy above; if porrect or oblique much longer, and usually with blade-like third joint. Venation never normal trifold; fore legs of male usually modified 167.

163. Tongue rudimentary, shorter than thorax, palpi massive and somewhat oblique; wings obliquely streaked *Amolita*.
 Tongue fairly strong, almost always functional 164.
164. Palpi oblique, triangular, beak-like, vestiture of scales, venation inter-mediid *Eustrotia* ? *albidula* and *malaca*.
 Palpi closely upturned to vertex 165.
165. Thorax with slight but distinct anterior and posterior tufts; fore wing blunt, oblong, nearly as wide at basal fourth as at widest point; trifid *Monodes* (*Oligia*).
 Thoracic tufts less distinct; fore wing triangular, with marked apex, silky, dark with contrasting discal spot; trifid *Platysenta*.
 Thorax with a slight posterior tuft or none, abdomen wholly untufted; wings with rounded apex, somewhat variable in form; t.p. line not straight; vestiture of spatulate scales 166.
 Thorax and abdomen untufted, clothed with simple scales, fore wing broad with marked apex, straight, white-streaked costa, and straight outer line; venation intermediid with fairly strong M_2 .. *Oruza* (70).
166. Reniform a strongly contrasting white U or V.. *Apamea* ? *u-album* (71).
 Reniform, a small white spot or not white *Caradrina* (72).
167. Palpi upturned to well beyond vertex, the third joint half as long as the second or more, close-scaled; the second joint also normally smooth or only a little rough-scaled, either joint distinctly blade-like only in species where the palpus only moderately exceeds the vertex. Fore tibia of male only half to three-fifths length of femur and fitting into a notch in it, without special tufting 168.
 Palpi normally blade-like and porrect, if upturned, extending to nearly twice height of head, and with strongly blade-like second and usually third joints 169.
168. Fore wing with marked apex and sinuous outer margin.. *Phalaenostola*.
 Fore wing rounded *Epizeuxis*.
169. With sharp wings, ground color yellow, our species marked with pink, *Prothymia*..
 Coloring dull 170.
170. Males (frenulum simple) 171.
 Females (frenulum of three bristles) 179.
171. Fore leg strongly modified, usually with a fan-like tuft on femur and one on tibia, tarsus reduced, except sometimes the first joint, and rising near the base of the tibia which is hollowed out to receive its tuft 172.
 Fore leg normal. *HYPENINI* 175.
172. Antennæ simply bipectinate *Philometra*.
 Antennæ with a nodosity and tuft at about basal third, unipectinate before it and bipectinate beyond *Hormisa*.
 Antennæ ciliate with a knot and spines near middle 173.
 Antennæ simply strongly ciliate 174.
173. Knot before middle of antenna, less conspicuous, palpi upturned with slender third joint *Zanclognatha*.

- Knot beyond middle of antenna, covered by a strong tuft of hair, the palpi with triangular third joint *Renia*.
174. Palpi with second joint bladelike and third slender *Chytolita*.
Third joint of palpi triangularly scaled, more than half as broad as second *Hypenula*.
175. Fore wing stumpy, with outer line evenly curved and cutting off a lens-shaped paler terminal area, outer margin rounded *Capis*.
Fore wings triangular, with acute apex, palpi shortish, with three shaded, even transverse lines on a gray ground *Salia*.
Fore wing with more or less sinuous inner margin, palpi long and beak-like, often different in the sexes, markings more complex when distinct, often all obscure and fuscous 176.
176. Palpi very broadly scaled above and below, nearly burying the third joint, hind wing deeply notched opposite cell *Hormoschista* (73).
Palpi less broadly scaled, outer margin of hind wing only a little sinuous 177.
177. Fore wing twice as long as wide or less.. *Bomolocha* (with *Lomanaltes*).
Fore wing more than twice as long as wide 178.
178. Inner margin decidedly sinuous, with a scale-tuft at anal angle, *Plathypena*.
Inner margin of hind wing practically straight, no scale-tuft.. *Hypena*.
179. Fore wing with a more or less distinct raised black tuft at end of cell (or reniform),—usually minute and wholly black, at lower angle of cell, but in *Capis* with white scales, and in *Hormoschista* larger.
HYPENINI 175.
Fore wing smoothly scaled..... most HERMINIINI (74).
180. Palpi upturned beyond vertex *Taniosea* (75).
Palpi moderate, normally oblique with broad rough second joint 181.
Palpi porrect about the length of the head, body slender, fore and hind wings similarly marked, hind tibiæ of male in our species notched and tufted *Pleonectyptera*.
181. Vestiture fine, with a distinct central ridge the whole length of the thorax; eyes not distinctly lashed, fore wing acute with even outer margin, abdomen with a basal tuft 182.
Without a central ridge on posterior part of thorax (most of the species with an anterior ridge have lashed eyes) 183.
182. Upper part of outer margin perpendicular to costa *Ipimorpha*.
Upper part of outer margin oblique *Pyrria*.
183. Trifid (M_2 from a quarter to half way up the cell, weak, M_3 not stalked, etc.) 184.
 M_2 at least half as large as the other veins and tubular, *ldcv.* more erect than lower part of *mdcv.*, M_3 often stalked with Cu_1 195.
184. Eyes distinctly, though often weakly lashed in front, decidedly lashed behind 185.
Eyes not lashed in front, though occasionally with a tuft on the base of

- the antenna, simulating lashes, behind with slight imperfectly differentiated lashes or none 186.
185. Front with fine, short, even, hairy vestiture, vestiture of body smooth, flattened or mixed *Homohadena*.
 From tufted above, the tuft more or less distinctly divided vertically and transversely, the collar with a more or less distinct central ridge, often evanescent when the tegulae are spread apart.. *Xylina*, etc. (76).
 Vestiture all of fine simple hair, without tufts *Homoglaea*.
186. Tongue weak, non-functional 187.
 Tongue normal 188.
187. Antennae of both sexes simple, abdomen with basal tuft, wings lanceolate, *Acronycta*, group *Eulonche*.
 Antennae of male subpectinate, of female simple, abdomen with basal tuft, wings normal *Acronycta*, group *Merolonche*.
 Antennae of both sexes pectinate, abdomen entirely untufted (larva aquatic, a borer) *Bellura*.
188. Abdomen with a dorsal crest at base, sometimes slight 189.
 Abdomen at most with loose hair at base, sometimes smoothly scaled 192.
189. Prothorax with a pyramidal anterior crest, a spreading or divided one posteriorly 190.
 Thorax with spreading anterior and posterior tufts, *Hadena*, groups *Sidemina* and *Luperina*.
 Thorax untufted 191.
190. Outer margin even *Hydracia*.
 Outer margin strongly wavy *Macronoctua*.
191. Palpi upturned about to vertex *Atethmia* (*Bagisara*).
 Palpi upturned about to middle of front *Acronycta* (*Apatela*).
192. Thorax with slight spreading anterior and posterior crests, hind tibia often with a spine between the spurs *Hadena*, group *Luperina*.
 Thorax with a slight anterior crest only 193.
 Wholly untufted 194.
193. Palpi of moth longer, tongue weaker, larvæ probably on marsh plants and perhaps borers *Scitia*, group *Arcnostola*.
 Palpi of moth moderate, larvæ external feeders and not associated with marshes *Caradrina*, group *Athetis*.
194. Vestiture of thorax mostly of spatulate scales.. *Atethmia*, group *Elydna*.
 Vestiture of narrow strap-shaped flattened hair *Calymnia*.
 Vestiture of fine simple hair *Cosmia* (*Enargia*).
195. Vestiture of imbricate large scales, with a fan-shaped mass laid flat on the eyeball in front of the antennae in the position of lashes (easily lost); a slight flat raised ridge on the base of the abdomen, and a large flap of broad scales covering the tympanic opening. Female frenulum of two bristles *Pactes* (*Ingura*).
 Female frenulum of three bristles, no scales over eye in the position of lashes, rarely with a scale flap over tympanic opening 196.

196. Palpi projecting forward twice the length of the head, or if somewhat shorter with the third joint half as long as the second 197.
 Palpi sickle-shaped, upturned beyond vertex 168.
 Palpi with third joint shorter, or shorter as a whole 205.
197. Third joint triangularly scaled above 198.
 Third joint only rough above and below 199.
198. Vestiture of fine flattened hair and hair *Antiblemma*.
 Vestiture imbricate, apparently scaly (some *Deltoides*) 169.
199. Stout, hind wing black and white 200.
 Slender, hind wing dull 201
200. Hind wing with black border; a massive frontal tuft extending nearly to tip of palpus *Meliopota* (77).
 Hind wing with yellow lunule in border, the whole third joint of palpus (which is long) projecting beyond the frontal tuft .. *Cirrhobolina* ♀.
201. Second joint of palpus with a sharp apical tuft above, third joint slender, porrect (possibly upturned in life) and conical, fore and hind wings with similar markings *Anticarsia*.
 Second joint of palpus merely clavate or rough-scaled 202.
202. Fore wing with apex slightly subfalcate, outer margin bent at middle; third joint of palpus slender, smooth and upturned *Hyamia*.
 Fore wing with regularly curved outer margin 203.
203. Palpi with upper side of second joint more broadly scaled than lower, the third joint more or less distinctly turned up 169.
 Palpi with the scaling longer on the under side of the second joint, third joint turned down 204.
204. Palpi with thinner second and blade-like third joint; reniform a dot, *Eucalyptra* (78).
 Palpi with second joint very broadly scaled below, third almost smooth-scaled; reniform a ring *Scolecocampa*.
205. Hind wing black and white or yellow 206.
 Hind wing dull or like fore wing 207.
206. Hind wings white with a yellow lunule in the black border; palpi thick extending well above vertex, with short third joint, *Cirrhobolina* ♂.
 Ground color of hind wings all the same, palpi more oblique, *Syneda* (77).
207. Vestiture of spatulate scales, our species with hind tibiæ of male notched and tufted, palpi oblique, beak-like, exceeding the head by its length, *Pleonectyptera*.
 Vestiture imbricate but deeper, the thorax with high anterior crest, vestiture of front short *Toxocampa*.
 No high anterior thoracic crest, vestiture fine and loose 208.
208. Front with a conical tuft; male with short tufts on legs..... *Phoberia*.
 Front with short hair; male with massive tufts on tibiæ, *Panapoda* (with *Siavana*).

Front somewhat tufted, male tibiae with very bristly tufting.... *Cissusa*.
 Front somewhat tufted, vestiture coarser, legs with massive tufts. Small
 mouths, expanding about $1\frac{1}{4}$ in. *Trama*.

Notes

1. When $M_2(5)$ of the hind wing is tubular, at least half as strong as the other veins, with a distinct connection to the cubital stem, and not more than a third as far from the cubital as from the radial side of the cell the venation is "*quadrifid*"; if M_2 is a third to half way up the cell, a mere thickening of the membrane, and the discocellulars above and below are about equally strong, it is *trifid*. Those in which the condition may be considered doubtful, especially in which the vein arises about a quarter way up the cell, or M_3 and Cu_1 (3 and 4) are decidedly stalked, are sometimes called *intermediid*, which implies a doubtful case, rather than any definite structure.

2. The primary differences between these three genera are in the larva.

3. Hampson has divided *Anarta*, removing the naked-eyed species to *Sympistis*.

4. *Timais*,—*Euthisanotia* of some authors.

5. A subarctic genus, separated by Hampson from *Scotogramma*, for the *phoca* group.

6. I should limit *Morrisonia* to *vomerina*, the only species showing any structural difference from *Mamestra*.

7. *Mamestra* may be divided into a number of groups, using characters largely given by Hampson, but they hardly seem natural or important enough to be given generic value.

Fore tarsus with several strong claws, front more or less rough.

Front projecting half the width of the eye (*Trichoclea*) *artesta*.

Front flat (*Epia*) *capsularis*.

Fore tarsus normal.

Front projecting half the width of the eye, rough (*Scotogramma*)... *trifoliū*.

Front flat and smooth, shining when denuded.

Male antennæ pectinate.

Pectinations twice as long as the segments without a longer terminal bristle *mucens*.

Pectinations and laminations fused into large triangular processes, without long bristles *lustralis*.

Pectinations about as long as segments, ending in a long bristle,
detracta.

Male antennæ serrate on the sides, and laminate, the laminations very deep in the species with obscure serration.

Thorax with high, divided crests,
discalis, nimbosa, purpurissata, etc.

Thorax with low, mostly diffuse crests.

Wings narrow, hind angle strongly retracted, pale gray,
distincta.

Fore wing half as wide as long, tending to be tufted at anal angle, fuscous brown *meditata*.

Male antennæ simple, ciliate, the laminations making the segments less than twice as wide as long.

Thorax with broad spatulate vestiture with rather strong tufting; abdomen with several tufts.

Anterior tuft usually high, divided.

Subterminal with a strong W-mark, anal angle strongly retracted, wing three sevenths as wide as long; dull gray or brown *confusa*,
subjuncta, grandis, atlantica, radix, canadensis.

Subterminal without a W-mark (typical *Mamestra*),
latex, lubens, adjuncta, etc.

Anterior tuft of thorax low and generally diffuse,
assimilis, goodelli, legitima, rugosa, anguina, pensilis, erecta, renigera, olivacea, lorea, laudabilis, etc.

Thorax clothed mostly with soft hair, with some flattened hair intermixed, appearing woolly; sometimes with slight ridge on collar and anterior crest; abdomen with a massive basal tuft only.

Apex rectangular, vestiture of disc of thorax fine (*Sideridis*) *rosea, congermana, rubefacta*.

Apex acute and outer edge oblique, disc of thorax with contrasting spatulate vestiture (*Ceramica*) *picta*.

All the genera in this group are very close. *Morrisonia* and *Xylomiges* may be separated by slight venational characters, *Barathra* by the fore tibia, *Nephelodes* differs from the hairy *Mamestræ* and even more from the *Tæniocampids* by the strong abdominal tufting; *Tricholita* by the broadly pectinate antennæ in the male and pectinate antennæ in the female. *Leucania* and *Tæniocampa* by the extreme weakness of the abdominal tuft; *picta*, in which this tuft is the weakest, being distinguished by its broad spatulate hair on the disc. Between *Sideridis* and *Cirphis* even this character is evanescent. *Crocigrapha* differs from all our narrow-winged *Mamestræ* in the

broad base of the wings, *Ulolonche* in the smooth overhanging frontal vestiture, combined with strongly flattened vestiture on the thorax.

8. *Leucania* is another polymorphic genus which has been divided by Hampson. It shows the following types of structure.

Collar and thorax in front with a decided central ridge *unipuncta*.
Collar without distinct central ridge, thorax with a slight divided tuft or none.

Body stout, vestiture mixed, of fine flattened hair and hair, abdomen with an obscure basal tuft, nearly buried in long hair. Male mostly with heavily tufted legs, fore wing with outer margin convex,
(*Cirphis*).

Abdomen, all tibiae and first two joints of tarsi very heavily tufted in male *pseudargyrea*.

Abdomen, and fore and middle tibiae only, heavily tufted. *multilinea*.

Abdomen and mid-tibiae rather strongly tufted, the latter with flat, curved outer spur *phragmitidicola*, *commoides*.

Body rather slender, vestiture mostly of hair and very narrow flattened hair, with a single row of spatulate scales on the patagia. Fore wing with apex acute and outer margin concave above Cu_1 , below convex and wavy. Male not specially tufted *linita*.

Body slender, vestiture mostly of blunt flattened hair, the row of black ones not much wider than the others. Wings very silky, apex acute and outer edge rounded; practically untufted (*Borolia*),

flabilis, *rimosa*, *ligata*.

Body stout, vestiture hairy and wholly untufted, collar slightly hooded; front prominent; fore wings acute and triangular (*Meliana* of Hampson, but differing widely from typical *Meliana*).

rubripennis, *albilinea*, *diffusa*.

Body fairly stout, vestiture wholly of rather fine hair and wholly untufted, patagia divergent, wings blunter than in the last group (typical *Leucania*) *fallens*.

9. In practically all, if not all Noctuidæ there is an under layer of scales close to the body, but this is not considered in these tables unless it is the superficial layer, at least on the middle of the patagiæ.

10. The character occasionally fails but I know no better. Hampson sinks it to *Sideridis*, but it seems closer to *Taniocampa* (*Monima*).

11. *Taniocampa* does not differ from *Orthodes* in the female. Hampson separates the group which runs out under group 21, as *Monima*, uniting *Himella*, the remaining species of *Taniocampa* and *Orthodes* as *Eriopyga*. *Graphiphora* is an earlier name, of doubt-

ful validity, both it and *Tæniocampa* applying especially to the first group. The *Tæniocampæ* (with *Monima* and *Himella*) may be grouped as follows:

Body stout, fore wing usually triangular with acute apex; vestiture entirely of hair, fine and woolly, collar with a slight central ridge,

(*Tæniocampa*, *Graphiphora*, *Monima*).

Male antennæ bipectinate *rubescens*.

Male antennæ strongly serrate and fasciculate

Fore wing triangular, with acute apex..... *alia*, *alurina*.

Fore wing very broad at base, with blunt apex *garmani*.

Male antennæ somewhat beaded and fasciculate,

revicta, with var. *subterminata*.

Vestiture never hairy and dense; in group *furfurata* overlaid with rough hair, but then the thorax is small and body slender; collar without central ridge, female ovipositor often exserted (*Eriopyga* in part).

Male antennæ bipectinate, wings stumpy *oviduca*.

Male antennæ serrate and fasciculate *planalis*, *culea*.

Male antennæ ciliate, wings triangular, silky, body slender,

intractata, *contrahens*, group *furfurata*.

12. *Orthodes* forms another group of *Eriopyga*. Each species shows some slight difference in secondary sexual characters.

13. *Euclidia* as usually defined includes two different types of structure, our single eastern species, and the European *E. glyphica* come here.

14. The exact distribution of spines is probably an unimportant character, but the best we have in this series. I have seen individuals of *Grammodes*, for instance, with an odd spine on the hind tibia.

15. *Catocala* is doubtfully distinct from *Phacocyma*, differing really only in coloration. The larva, pupa and habits are also the same. Hampson divides *Catocala* into *Catocala* proper, *Euparthenos*, *Catabapta*, *Mormonia*, *Ephesia*, *Allotria*, *Andreusia*, and *Corisce* on minor differences in palpi, spines, and tufting.

16. *Cænurgia* is the subgenus of *Drasteria* with pectinate male antennæ.

17. Probably *Phrurys*, *Poaphila*, *Agnomonina* and *Parallelia* could be united in a single genus with very little strain, but the larvæ are not well enough known to make it really safe.

18. *Amella* only.

19. Includes *Homoptera* and *Pseudanthracca* which are identical

in structure and plan of markings, and the subgenus *Zale* which has no tufts on the middle femora. *Calycanthata* belongs to *Zale*.

20. Our species placed by Hampson in *Parallelia*.

21. The secondary sexual characters are not really satisfactory for general use, and in this, the Agrotid group, their use would separate very closely related species, so I have gone back to Grote's point of view and combined a number of Smith's genera. It will be noted that *Feltia* and *Rhizagrotis* have been divided; this is largely because their frontal characters seem to have been misinterpreted in the past. The frontal ridge, used by Hampson for *Feltia* is an accident, always absent in some species, and constantly present in none, so far as I know. Some species of *Rhizagrotis* lack the raised ring and in the typical group it is entirely obliterated by the central horn. The principal other changes are the transfer of *geniculata* and *scandens* to *Feltia* on frontal characters, and the change of *fen-nica* from *Noctua* to the ypsilon group on characters of wing form and tarsal spinulation. *Pachnobia* must include *rava*.

The following subordinate groupings may be made:

Euxoa.

Male antennæ broadly pectinate.

Fore tibiæ with very heavy blunt spines *venerabilis*, *gladiaria*.

Fore tibiæ lightly spined typical *Agrotis* (exotic).

Male antennæ heavily serrate and fasciculate.

Fore tibiæ with heavy sharp claws at tip, grading into normal spines above, male genitalia characteristic *Euxoa* s. str.

Fore tibia with one or two heavy usually blunt claws on inner, and about 7 graded ones, on outer side.

Wings narrower, more rectangular.

Hind wings translucent *annexa*, *malefida*.

Hind wings opaque *volubilis*.

Wings broader, more triangular.

Spinules of fore tibia stubby *vetusta*.

Spinules of fore tibia sharp *mimallonis*.

Male antennæ nearly simple (genitalia characteristic) *Chorizagrotis*.

Feltia.

Male antennæ with well-developed pectinations, vestiture rather fine (*Onychagrotis*) *rileyana*.

Male antennæ subpectinate and heavily fasciculate, vestiture almost scaly, *geniculata*.

Male antennæ strongly serrate and fasciculate.

Serration very heavy, vestiture mostly of feathery spatulate scales,
group *subgothica*.

Serration light, vestiture loose and almost hairy.. *scandens*, *quebecensis*.

Male antennæ ciliate, simple.

Fore wing rectangular, body heavy, habitus *Euxoa*-like *acclivis*.

Fore wing triangular, body light, suggesting *Amolita*, etc. *apicalis*.

Noctua.

Tarsi with a well developed upper row of spines, sparser than others, as in *Feltia*, etc.

Wings very narrow, oblong.

Male antennæ pectinate for basal three-fourths.

Apex acute and outer edge rounded *violaris*, *aurulenta*.

Apex rectangular and outer edge bent in the middle.... *ypsilon*.

Wings broad, triangular, antennæ nearly simple,

(*Peridroma*) group *astricta*.

Tarsi with at most one or two spines of the upper row.

Palpi clavate.

Both wings more triangular, hind wings somewhat iridescent and translucent on disc.. (*Peridroma*) groups *saucia*, *infecta*, *lubricans*.

Wings less triangular, hind wings opaque in both sexes,

(*Noctua* s. str.).

Vestiture largely spatulate, narrower on disc, the tarsi with three regular rows of spinules.

Spinules of fore tibia concealed *baja*.

Spinules of fore tibia evident group *c-nigrum*.

Vestiture all alike, fine flattened hair, forked at tip, central row of spinules broken up *plecta*.

Vestiture on disc of blunt hair, tending to form two longitudinal ridges, on patagia of fine flattened hair, tarsi usually with central row of spinules simple group *brunnea*.

Palpi upturned, more closely scaled.

Vestiture of fine flattened hair, 12 spinules on each side of fore tibia, abdomen of female normal *haruspica*.

Vestiture coarser, six spinules on each side of fore tibia, abdomen of female with a thickened patch on each side, near tip.. *clandestina*.

Pachnobia.

Male antennæ broadly bipectinate to apex, costa arched, metatarsi with upper row of spinules *manifesta*, *monochromatea*.

Male antennæ with pectinations only twice as long as width of joints, with serrate apex, costa slightly concave; with upper row of spinules,

salicarum, *okakensis*, *littoralis*.

Male antennæ serrate and fasciculate, upper spinules wanting, wing form as in the second group.

Palpi clavate with dense vestiture and short third joint hair of vestiture forked *fishii*.

Vestiture of simple hair, bristling on palpus, which has a longish third joint *cinerea*.

Male antennæ simple, ciliate, tarsi with upper row of spinules.

Vestiture of simple hair *wockeii*.

Vestiture of forked hair *rava?*, *juncta*.

Eurois.

Hind metatarsus at least, with a sparse row of upper spines.

Abdomen cylindrical, body strongly tufted (*Eurois*) *prasina*.

Abdomen very strongly flattened, vestiture smooth.

(*Triphæna*) *fimbria*, exotic.

Hind metatarsus usually with the three rows of spines on the under side only, rarely (*e. g.*, *stellaris*) with one or two subdorsal spines.

Fore tibiæ slightly spined (*Aplectoides*, *Platagrotis*).

Vestiture of inner half of patagia much coarser, fore wing more triangular, approaching typical *Eurois* *pressa*. *

Vestiture even, smooth, largely hairy, wings rectangular, with normally arched costa *imperita*, *condita*, *speciosa*.

Fore tibiæ unarmed.

Male antennæ bipectinate (*Semiophora*, *Matuta*).

Antennæ broadly pectinate, front concolorous.

Vestiture mostly hairy, thorax very stout, palpi beak-like, fore wing with rectangular apex and outer edge straight to Cu_1 *tenebrifera*. *

Vestiture mixed group *climata*. *

Antennæ of male narrowly pectinated, front black ... *opacifrons*.

Male antennæ simple.

Slender, with strongly arched costa and marked apex of fore wings; antennæ slightly serrate.

Female wings reduced (*Anomogyna*) *latabilis*.

Female wings normal *sincera*.

Abdomen more or less, usually strongly, flattened, with lateral fringes of hair; antennæ usually wholly simple, fore wing with straight costa and usually blunt apex.

Vestiture of second joint of palpus loose.

Wings short, abdomen little flattened, hind wings yellow, *gilvipennis*.

Fore wings long, abdomen strongly flattened,

brunneicollis, *rufipectus*.

Second joint of palpi clavate, third joint often porrect and beak-like.

Abdomen extremely flattened *Rhynchagrotis*.

Abdomen moderately flattened.

Fore wing more acute at apex,

(*Adelphagrotis*) *stellaris*, Western.

Fore wing with blunt apex *Eueretagrotis*.

The last three groups are hardly distinct. Typical *Rhizagrotis* (*cloanthoides*, *albalis*, etc.) is purely western and differs from *acclivis*, etc., in having no upper spinules on the tibiæ, and a decidedly conical frontal prominence.

22. Smith evidently had a defective specimen as he saw but one pair of claws.

23. Hampson separates this from *Schinia*, at one time each was still further divided.

24. *Dasyspondæa* had perhaps better be united with *Rhododipsa*. They are similar in structure, but a little different in range of color and the markings of the hind wing; a single species of each has been reported from Wisconsin.

25. *Rhodophora* and *Schinia* intergrade, the pink species of the latter (*regia*, *sanguinea*, and *gloriosa*) might be transferred to the former or the genera united. *S. saturata* has only two strong claws, differing hardly at all from *Eupanychis*.

26. *Heliocheilus* is distinct enough from *Heliothis* but probably a synonym of the oriental genus *Raghuva*.

27. Hampson transfers the name *Heliothis* to certain small-eyed western and exotic forms, using *Chloridea* for all our species. *Ononis* connects the two types.

28. Hampson unites this genus with the next.

29. *Fruva*.

30. *Caducus* Dyar, our smallest Noctuid.

31. The only species in our area are *ætheria* and *secta*. The venation varies widely, there often being a large accessory cell. Smith mistook specimens of *secta*, for *æria*.

32. I should place in *Ozarba*, *nigellus*, *humerala* and *puncticosta*. It seems to be a reduced *Epizeuxis*, as Strecker considered it, rather than *Erastrine*.

33. Typical *Nonagria*, with a simpler frontal prominence, does not occur in our area.

34. *Nigrofimbria* is our only species, structurally *semiflava* is a typical *Tarache*.

35. Also sometimes known as *Gortyna* or *Ochria*. *Buffaloënsis* (= *latia*) is our only species.

36. The typical group does not occur in this country. I have used the name here to include *defecta*, *orphnina*, *rufostriga*, *panatela*, and *inquinata*, with its probable varieties *variana* and *orientalis*. These have been variously distributed, but all are strigose marsh species, with a good deal in common. The first two will run out here, agreeing in structure with Hampson's characterization of *Canobia* rather than *Arcnostola*, where he places them with *S. inquinata*. He makes *rufostriga*, type of *Hypocana*. Smith puts *defecta* in *Senta*, *inquinata* in *Tapinostola* and *panatela* in *Erastria*. *Rufostriga* has been considered a *Caradrina*, and a *Leucania*.

37. Hardly worth separating from *Bellura*.

38. *Anchocclis*.

39. Because of their intermediate position the Hyphenini have been run out on both sides. *Hormoschista*, by the way, is very near *Hypena*.

40. Dyar divides the genus as follows:

Palpi with a loose tuft on under side of tip of second joint, very long, with third joint two-thirds as long as second, wings narrow *Eosphropteryx*.
Palpi merely rough-scaled below, shorter or without tuft on second joint, wings broader.

Palpi exceeding vertex most of the length of the long third joint.

Wings subfalcate *Panchrysia*.

Wings rounded or with rectangular apex *Polychrysia*.

Palpi with only tip of third joint beyond vertex, often clavate.

Eyes much narrower than front, hind wing normally yellow,

Syngrapha.

Eyes usually the width of the front, hind wings rarely yellow.

Fore wing falcate, bent at middle and concave on upper half of outer margin *Plusia*.

Fore wing with apex merely rectangular, and even, evenly curved outer margin, caterpillars internal feeders *Euchalcia*.

Fore wing with extreme apex rectangular or rounded, outer margin crenulate *Autographa*.

41. *Aurantiago*.

42. *Carnosa*.

43. *Scricca* and *pastillicans* with its pink variety *tremula*. The two former can be distinguished, I believe, by the fine pale line on

the inner margin of the fore wing, which is cream in *sericea* and pink in *pastillicans*. The pale lines on the veins sometimes fail, though strong in a large majority of *sericea*, and rare in *pastillicans*. The genitalia are strikingly different.

44. *Alctia*.

45. Includes *Calloplistria*, *Euherrichia* and *Methorasa*, with a great variety of exotic forms. Group *Calloplistria* has angulate wings and a knot in the male antennæ; *Euherrichia* has angulate, and *Methorasa* rounded, fore wings, with normal male antennæ.

46. *Mesolomia* of Smith, *Trigonophora* of Hampson.

47. In the case of *Fagitana*, *Spragucia*, etc., related species indicate that $M_2(5)$ has disappeared *in situ*, being sometimes indicated by a slight thickening of the membrane and crowding of the scales, only visible in stained and bleached specimens. In *Characoma* it is probably M_3 and Cu_1 that have fused completely.

48. *Nycteola revayana* only.

49. *Characoma nilotica*, according to Dyar, is an older name for his *Nycteola proteölla*. It is a wide-spread subtropical species.

50. The western species referred to *Cerma* have nothing to do with it, but belong more nearly to *Bryocodia*: so far as I know *C. cora* is unique, having perhaps its closest relative in the even odder *Harrisimemna trisignata*.

51. Also known as *Gortyna* and *Hydræcia*. *Cerina* seems not to belong here, but is in every way, even to coloring, a *Xanthia*, closely related to some European species.

52. *Telcsilla* of some lists, but quite different from the European *T. amethystina*.

53. Also known as *Erastria*, and including *Argillophora*, which does not seem to differ in structure. We have no really typical *Eustrotias*, but most of our species are congeneric with *L. bellicula*. The others are provided for elsewhere in the tables.

54. *Acontia*. *T. terminimacula* has a fovea and therefore belongs to Hampson's first group. Group *Tarachidia* differs in the trifid venation of the hind wing.

55. Separated from *Bryophila* by Hampson.

56. This is almost deserving of a separate genus. Its relationships seem more with *Fagitana* than *Eustrotia*, but I have no material for dissection.

57. The typical group, including *jocosa* and *major*, runs out here. *Momaphana comstocki* with somewhat larger eyes and stronger tongue, hardly deserves a separate genus.

58. Here we run into the *Hadena* and *Orthosia* groups. The genera are largely ill-defined on their boundaries, though well marked in their typical forms. Such as are particularly close to *Hadena* have been reviewed in this JOURNAL, Vol. 21, p. 179. At this point there will be difficulty with *Apamea crepta*, which has the apex of the fore wing rounded, but a perfectly even outer margin, and the habitus of *Apamea*, and with *A. velata*, whose apex is subfalcate, but the outer margin distinctly wavy.

59. Including *Pteratholir*, in which the fovea is strongly developed, but not *teratophora*, which is, I believe, a *Bryocodia*.

60. Several other Orthosiids may possibly run out here, the genera in this group being ill-defined. I believe this will prove congeneric with the European *Hoporina croceago*, both having the same wing-form, tufts, and flattened abdomen.

61. *P. exprimens* comes here, *P. umbra* has but a single abdominal tuft.

62. The type of *Metalectra*, *M. praeisalis*, is extremely close to our *discalis*. Typical *Homopyralis (contracta)* differs in having no special tufting on the legs, and may be kept as a subgenus.

63. *Chutapha* of Hampson, who transfers the name *Trigonophora* to the iris group.

64. *P. xanthioides* has normal palpi, and becomes so far as I can see indistinguishable from *Hadena*. Still it looks like a *Perigea*.

65. Differs from *Actinotia* (of Europe), with which it has been united, in the unarmed tibiae. Too close to *Hadena*.

66. I do not believe these genera are distinct.

67. A genus formed by Hampson for *capax*. *Polia* will run out either here or with *Hadena*, and some species seem closely related to each. Group *Eurotype* differs from *Xylotype* in the pectinate antennae, and the difference from *Hadena* is perhaps in the tuft of hair-scales on the basal joint of the antennae, simulating lashes.

68. Grote fixed the type of *Microcalia* as *fragilis*. This is an *Acronycta*, typical of the smaller scaliar group, so Hampson provides the new name *Leuconycta* for *diphteroides*.

69. *Diphtera* and *Moma* of our lists, but these belong to the *Pantheinae*, while *Agriopodes* is hardly distinct from *Acronycta*.

70. *Albocostaliata*, originally described as a geometer, referred here on Dyar's authority. The type of *Oruza* is a very similar South American species.

71. Also sometimes placed in *Fagitana*. It seems out of place in either.

72. Including *Anorthodes*, *Proxenus*, etc., *Athetis* of Hampson.

73. I believe this is a true Deltoid, near *Hypcna*.

74. The genera of this group are separated almost entirely on male characters. *Hypcnula* can be distinguished from most of the others by its blackish coloration, and long rough palpi with triangular end-joint. *Chytolita* is light clay-color with sinuous outer line, but a couple of *Zanclognatha* are similar. *Zanclognatha* can generally be distinguished by its more distinctly curved palpi. *Hormisa* is composed of three dissimilar species, one marked with straight transverse lines, one with longitudinal bars, and the other similar to *Chytolita*. *Renia* and *Philometra* also come out here.

75. *Parastichtis* of Smith but not of Hampson.

76. Here will come the species on our lists as *Xylina*, *Calocampa*, *Scopelosoma*, *Lithomia*, *Litholomia*, *Brachycosmia*, (*Anchocelis*), *Glœa*, *Epiglœa*, and those *Orthosias* placed by Hampson in *Amathes*. The characters for individual genera as given by Lederer, Smith and Hampson, are largely based on slight differences in the tufting, which often fail in specimens with the thoracic parts in a slightly different position, or the abdominal tufting, which is particularly evanescent in the group, and varies within the genera as now understood; and on the markings, which are differently interpreted in Europe and America. The European species nearest to *Papaipema cerina* for instance, is there considered a *Xanthia*; those corresponding to *Orthosia* (*Amathes*) *bicolorago* also as *Xanthia*, while the type represented by our *Xanthia puta* and *pulchella*, is the European *Orthosia*. There is quite a little variation in wing-form and markings in the two overlapping genera *Xylina* (*Grapholitha*) and *Episilia* (*Scopelosoma* plus *Glœa* in part) sufficient to cover the other nominal genera. Not enough of the larvæ are known to help much, but those of *Scopelosoma* are of two widely divergent types, one agreeing with *Jodia* and *Amathes* in a general way, the other unique.

77. *Limbolaris* is, so far as I can see, a typical *Syneda*, and was placed there until Smith's catalogue was published.

78. Often misspelled "*Eucalyptera*."

Postscript. The thirteenth volume of Hampson's Catalogue of the Lepidoptera Phalaenæ has just appeared. *Euclidia* is divided, our species going into *Gonospelcia* Hübn., if the Tentamen be ignored. *Drasteria*, as a result of the first species rule disappears, to be replaced by *Cænurgia* Grote, *Mocis* is used in place of *Kemigia*. For another reason *Argyrostromis* Hübn. is used in place of *Agnomonis* Hübn., and is made to include *Poaphila* (excepting a few transferred to *Phruris*). *Zalc* replaces *Phæocynia*, following the law of priority. In the Pantheids *Diphthera* is used in place of *Panthea* and *Colocasia* in place of *Demas*. *Plusia* is quite differently divided, and the names differently applied. A few species of *Plusia* have spined tibiæ, and will run out in the table to alternative 25, where they may be separated by their strongly lashed eyes. Quite a good many have a few spines on the hind tibia, and *Autographa* and *Syngrapha* (interchanged in significance), are used for them, reviving *Phytometra* (a name formerly used for a variety of Noctuids and Geometers) for the more normal *Plusia* group, including *Plusia*, *Euchalcia*, *Panchrysia* and part of *Autographa* of Dyar's list.

EXPLANATION OF PLATE I.

Fig. 1. Venation of *Noctua c-nigrum*, typical of the *Trifida*, the veins numbered according to the Comstock-Needham and German systems.

F.h. Frenulum-hook.

acc.c. Accessory cell (cell 1st R_3).

udcv. Upper discocellular vein.

mdcv. Middle discocellular vein.

ldcv. Lower discocellular vein.

Subm. sp. Submedian space (cell Cu + 1st A).

cell. Discal cell (cell R + 1st M_2 + M).

C. Costal vein.

Sc. Subcostal vein.

R. Radial vein, with its branches R_1 , etc.

M_1 , M_2 , M_3 . The branches of the median vein, whose base is lost.

Cu. Cubital vein; Cu_1 , Cu_2 its branches.

2d A, 3d A. The anal veins. 1st A lost in both wings.

fren. Frenulum.

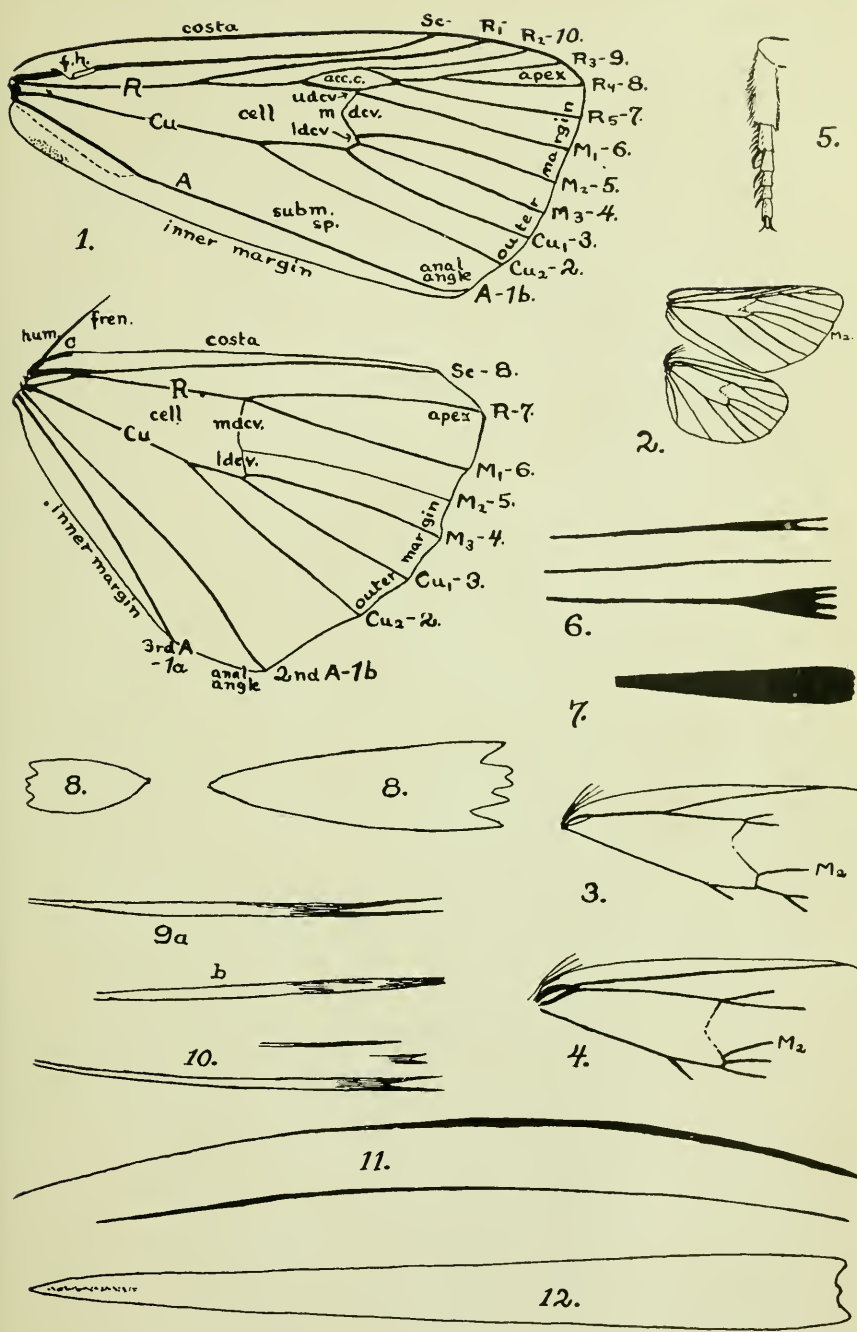
hum. Humeral angle.

Fig. 2. Venation of *Panthea*, a fairly normal quadrifid.

Fig. 3. Characteristic intermediid venation,—costa and cell of hind wing.

Fig. 4. Typical quadrifid venation,—costa and cell of hind wing.

Fig. 5. A heavily spinulated tarsus,—*Epia capsularis*.



Northeastern Noctuidæ

Fig. 6. A flattened, a simple and a spatulate hair from thorax of *Morri-sonia (Mamestra) confusa*. The tip only is shown in this and the following figures 7, 9 and 10.

Fig. 7. The characteristic spatulate scale of *Xanthopastis timais*.

Fig. 8. Simple scales, from *Prothymia*.

Fig. 9. Flattened hair.

Fig. 10. Flattened and simple hair from *Xanthia*.

Fig. 11. Coarse and fine simple hair.

Fig. 12. Much elongated simple scale from *Eutelia*. Those of *Eriopus* are similar.

Figures 8 to 12 are all at approximately the same scale.



LYCÆNIDÆ OF CALIFORNIA DESCRIBED BY BOISDUVAL.

BY WILLIAM PHILLIPS COMSTOCK,

NEWARK, N. J.

The account in the *Annales de la Société Entomologique de France* for 1852 where Boisduval tells of the collecting trials of his friend Lorquin makes very interesting reading. Lorquin must have been an assiduous and sharp-eyed collector, for it was a fine collection of California butterflies that he sent Boisduval as described in the first paper. Among the Lycænidæ there were twenty-five species, twenty-three of which were new, and a glance through the check lists will show a dozen more butterflies accredited to the same paper. Indeed, Boisduval's names form the backbone of a taxonomic study of the California material. Of the twenty-three species of Lycænidæ he first described in 1852, twenty-one stand unquestioned to-day as good species, one may or may not be considered a variety, and one only becomes a synonym. Boisduval's second paper on California Lepidoptera appeared in the *Annales de la Société Entomologique de Belgique* in 1869 and contained a list of the species previously described, additional species recorded as captured, and the descriptions of seventeen new Lycænidæ together with other Lepidoptera. Of these seventeen names, I consider five only as specifically good; ten are synonyms, and two are varieties of other species. This loss of specific rank for the Boisduval names came about by the activities of our own American collectors during the years between Boisduval's papers. Edwards,

Reakirt and Behr were actively describing material and they even contributed considerably to the synonymy by redescribing some of Boisduval's species of 1852. Felder also named two species in 1865 for which Boisduval gave us new names in 1869, making in regard to one a very curious confusion as he redescribed one of his own species of 1852 by which, of course, his second name and Felder's name are dropped into synonymy.

In regard to a considerable number of Boisduval's species, our present check lists are in a most chaotic condition. Some species have stood with a question mark after them, always *nomina nuda*; others have been put into the ignominious seclusion of synonymy, some justly, others unjustly, some ignorantly for the blues are frequently wrongly referred. There is one interesting case of transposition of names, and it is remarkable how this occurred. The only way to clear the confusion is to systematically trace each species out and learn its history, a tedious process of studying check lists.

The publication of the first part of Volume IX of *Études de Lépidoptérologie Comparée* by Charles Oberthür, in which are figured the Boisduval types of California Lycænidæ, corrects the mistakes of two generations and gives us an opportunity to see what Boisduval's names really mean.

16.¹ *Thecla sylvinus* has never before been recognized by American collectors but it is easily determined from the figure as a fairly common California insect which has until now been misnamed in collections. I have seen it under the label of *itys*, *dryope*, *californica* and even *tacita*.

17. *Thecla aurette* has been equally unknown unless we take Strecker's word for it that he knew the species, which is not at all unlikely. Both *tetra* Behr and *spadix* Henry Edwards sink as synonyms of this species.

18. *Thecla sarpium* as figured is interesting because of the pronounced median lines of white spots shown in the figure. This is not the usual form found, as judged by material found in eastern collections, because the white scales are obsolete to absent in most cases.

19. *Thecla grunus* is well known and is easily recognized.

20. *Thecla iroides* is a valid species closely allied to the eastern *augustus*. I do not consider it a synonym as Dr. Henry Skinner states in the *Entomological News*, vol. XXV, p. 47.

¹ The numbers and genera are those of the 1852 paper.

21, *Thecla eryphon* is also easily separable from eastern *niphon*. I think larval investigation of the four species just cited would give ample proof of their validity.

22. *Thecla dumetorum*, Dr. Skinner calls a synonym of the European *rubi* Linn., but I prefer to call it distinct, and Messrs. Haskin and Grinnell have pointed out the differences in a paper in the Entomological News, Vol. XXIII, p. 3.

23. *Polyommatus hypophleas* was described in the 1852 paper by Boisduval. Oberthür does not figure it.

24. *Polyommatus helloides*, .

25. *Polyommatus gorgon*, and,

26. *Polyommatus xanthoides* are all well known.

27. *Polyommatus arota* is not commonly found in collections but is, I feel sure, a good species distinct from *virginiensis* Edwards.

28. *Lycæna amyntula*, and,

29. *Lycæna exilis* are easily recognized.

30. *Lycæna antagón* is the only synonym of the 1852 paper. It falls before *acmon* Doubleday and Hewitson, described in the same year.

• 31. *Lycæna xerces*, and,

32. *Lycæna scipiolus* are easily recognized.

33. *Lycæna icarioides* I do not think so well known. It is constantly confused with *Lycæna erymus* Boisduval which is placed as a synonym of it, in our check lists. The figure shows it to be at least a distinct variety.

34. *Lycæna pheres*.

35. *Lycæna heteronea*, and,

36. *Lycæna enoptes*, present no difficulties.

37. *Lycæna piasus* furnishes the most interesting discovery of the paper. This name has been long attached to a western form of our widely spread and variable *Cyaniris ladon* Cramer (or *Lycæna pseudargiolus* Bdv. and Le Conte) and it is a most remarkable case of misidentification. W. H. Edwards seems to have been responsible for placing it under *pseudargiolus* and later writers have followed him. *Lycæna piasus* is the butterfly that is now commonly recognized under the name of *sagittigera* Felder, and curiously Boisduval redescribed it as *rhæa* in 1869. It is a much named butterfly as W. H. Edwards named it twice, Reakirt, Behr and Felder once each, and Boisduval himself twice, his first name standing.

38. *Lycæna pseudargiolus* is mentioned by Boisduval as taken in California, and he must have got the western form which we have so long known as *piasus*; however he did not distinguish it and says in his 1869 paper that it does not differ from individuals taken in other parts of the United States. It would have been interesting if Oberthür had figured a specimen from the Boisduval material.

39. *Lycæna antiacis* is an extra large and aberrant specimen of the xerces and mertila group. I agree with the opinion of Mr. F. X. Williams¹ that there is probably one species with several varieties here.

This closes the 1852 paper and the following species were described in 1869.

14.² *Thecla spinctorum* is easily recognized and distinct.

15. *Thecla borus* is a synonym of *Thecla californica*, Edwards.

17. *Thecla nelsoni* is commonly recognized.

19. *Polyommatus nivalis* may be now resurrected from synonymy where it was placed by Kirby in his catalogue of 1871 and since copied by American authors. Kirby placed it as a synonym of *mariposa* Reakirt, a case of misidentification. *Nivalis* has been known in our collections as *zeroe* Bdv., and *ianthe* Edwards was considered a synonym of it. *Ianthe* is really a synonym of *nivalis*.

20. *Polyommatus zeroe* is really a synonym of *mariposa* Reakirt. Thus *nivalis* Bdv. reappears in our lists as a valid species and *zeroe* becomes a synonym.

22. *Lycæna regia* is a synonym of *sonorensis* Felder.

23. *Lycæna lupini* is a very interesting form of *Lycæna acman* Doubl. and Hew. W. H. Edwards erroneously made it a synonym of his *shasta* in his catalogue of 1884 and this mistake has been copied by later writers.

25. *Lycæna nivium* is a synonym of *shasta*, Edwards, 1862.

26. *Lycæna philemon* is a synonym of *anna*, Edwards 1861.

27. The male of *Lycæna rufescens* as figured might be called a variety of *sapiolus* Bdv. 1852. The insect figured as female *rufescens* is really a female of *dædalus*, Behr. 1867. The relationship of these insects needs study as well as the synonymy. Incidentally *dædalus* Behr. is not a synonym of *icarioides* Bdv. as given in our

¹ Ento. News, Vol. XIX, p. 476 and Vol. XXI, p. 30.

² The numbers and genera are those of the 1869 paper.

present check lists, but is related to *sapiolus* BdvI, of which I think it may be a variety.

28. *Lycæna crymus* is given in the check lists incorrectly as a synonym of *icarioides* BdvI.

29. *Lycæna polyphemus* is a synonym of *mertila* Edwards 1866 as before mentioned.

30. *Lycæna evius* does not fit very happily as a variety of *pheres* BdvI, as now listed. Its relationship I have not tried to work out.

31. *Lycæna nestos* is a synonym of *podarce* Felder 1865.

32. *Lycæna phileros* is a good species.

33. *Lycæna rhæa* is the insect until now generally called *sagittigera* Felder. It is a synonym of *piasus* BdvI, 1852, as I remarked before.

34. *Lycæna suasa* is a synonym of *fuliginosa* Edwards 1861.

I have tried in working out the identity of the Boisduval material to confine myself to the statement of the facts. I have made my identifications from liberal series in most cases and have made my comparisons in daylight, having the assistance of Mr. F. E. Watson in checking comparisons. I am sure any one else with a liberal supply of material at command would reach like results. Mr. Oberthür has certainly rendered a very great service to American students and to those in charge of our public collections by figuring the types of Jean Alphonse Boisduval.

ANTS COLLECTED BY W. M. MANN IN THE STATE OF HIDALGO, MEXICO.¹

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During the spring and summer of 1913, Mr. M. W. Mann, of the Bussey Institution, was able, through the kindness of Mr. B. Preston Clark, to make an extensive collection of insects in the state of Hidalgo, Mexico. Considerable attention was devoted to the ants and myrmecophiles, as no one seems to have collected these in Hidalgo, though this state is at no great distance from the Mexican capitol. At any rate, I fail to find a single ant cited from Hidalgo in

¹ Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 74.

Forel's volume on the Formicidae in the "Biologia Centrali-Americana." Hence it is not surprising that Mr. Mann's collection should prove to be of unusual interest. All of the specimens were taken at altitudes above 7,000 ft., as will be seen from the following brief notes on the localities in which he collected:

Pachuca. The capitol of the State of Hidalgo, at an altitude of 8,000 ft., situated among low hills, on the slopes of which, in the immediate vicinity of the town, many specimens were taken. The territory is arid, with abundant cacti; in the hollows there are many pepper trees (*Schinus molle*).

Guerrero Mill. This locality is cited for ants taken within a radius of a couple of miles of an ore mill situated on the eastern slope of the high mountain range east of Pachuca. The altitude of the territory over which collections were made, varies from 8,500–9,000 ft. The country is wooded, with oaks and pines predominating. In many of the deeper canyons moisture prevails throughout the year, but the hillsides at times become very dry.

San Miguel. This locality denotes a stretch of semi-plain country, stretching from Velasco (about two miles below Guerrero Mill and at an altitude of about 8,000 ft.) to the eastward. The little village of San Miguel at an altitude of about 7,000 ft. is approximately in the center of the country in which the collections were made. In general the land is rolling, with large, level, semi-arid tracts. A barranca opens into the plain directly from the tropics of the "tierra caliente."

The collection is very interesting in the following respects:

1. Though made at rather high elevations, it comprises a long series of new forms, e. g., a new legionary ant (*Eciton manni* n. sp.), a new *Monomorium* (*M. cyaneum* n. subsp.), with metallic blue workers, a new *Phcidole* of the subgenus *Allophcidole* (*Ph. centratl* n. sp.), with polymorphic workers, a new *Stenamma* (*S. manni* n. sp.), closely allied to the other species of this genus, hitherto known only from subboreal America and Eurasia, a new *Myrmica* (*M. mexicana* n. sp.), related to *M. punctiventris* Roger of the Atlantic States and *M. sulcinodis* Nyl. of Europe, a singular *Leptothorax* (*L. manni* n. sp.), two interesting *Formica* (*Formica subcyanea* n. sp. and *nahua* n. var.), a new amazon ant (*Polyergus montezuma* n. var.), a dark variety of one of the honey ants (*Myrmecocystus melanoticus* n. sp.), a new *Lasius* of the subgenus *Acanthomyops* (*L. mexicanus* n. subsp.), and a new *Camponotus*, *C. pellaris* n. sp. allied to *C. chilensis*.

2. Thirty-four of the thirty-nine forms enumerated in this paper, or 87 per cent. nest under stones. The exceptions are the two species of *Myrmecocystus* and *Pogonomyrmex barbatus*, which make crater nests in the ground, *Pseudomyrma flavidula*, which nests in hollow twigs and *Camponotus nitidus*, which lives in wood.

3. Equally striking is the pronounced melanism, which in a large proportion of Hidalgo ants is not only very apparent in the males and females, but extends also to the workers. This phenomenon is observable in fully twenty-nine, or 74 per cent. of the forms. The only ones in which a decided increase of pigmentation is not apparent in the worker phase, are *Odontomachus clarus*, *Ponera inextorata*, *Eciton cæcum*, *Pseudomyrma flavidula*, *Solenopsis minutissima*, *Pogonomyrmex barbatus*, *Lasius mexicanus* and *Formica nahua*. In four of these, the species of *Ponera*, *Eciton*, *Solenopsis* and *Lasius*, the worker, as shown by the vestigial eyes and pale coloration, is hypogæic in habit. The absence of melanism in the few remaining species is not so readily explained, but is also probably associated with peculiarities of habit.

Undoubtedly this pronounced melanism in the ants of Hidalgo is due to the intensive and protracted insolation to which they are subjected at the high altitudes in which they live. The same peculiarity has been noticed in alpine insects in Mexico and other parts of the world, in mollusks, birds and mammals. Herrera and Lope call special attention to it in their voluminous work on the plants and animals of the Mexican plateau.²

It is interesting to note that Mr. Mann, who is preparing a paper on the Hidalgo myrmecophiles notices a high degree of melanism in some of these, especially in a species of *Xenodusa* (*X. sharpi*) and in two other Staphylinids of the genera *Dinardilla* and *Apteronina*, which live with *Liometopum apiculatum*, itself a melanistic, subalpine species.

4. Still another peculiarity, which has impressed me while working on the Hidalgo ants, is the great length of the wings in the females, especially when these have large heavy bodies, as in the genera *Pheidole*, *Lasius*, *Camponotus*, etc. Of course nearly all heavy bodied female ants have long wings, to facilitate the nuptial flight, which not only serves to unite the sexes from different nests, but is of very great

² Herrera, A. L., and D. Vergara Lope, *La Vie sur les Hauts Plateaux. Mexico*, I. Escalante, 1899, 790 pp., 111 plates, 19 tables.

importance in distributing the species over considerable land areas. Now comparison of specimens of closely allied species or of the same species from high altitudes and sea-level shows that the mountain forms have distinctly longer wings. To take only one common example, females of *Lasius niger* L. var. *americanus* Emery from Wisconsin and Illinois have the fore wings only 7.5–8.5 mm. long, whereas these appendages in females of the same size and weight from altitudes of 7,000–8,000 ft. in Colorado measure 9.5–10.5 mm. This enlargement of the wing membranes in mountain ants, which I shall consider in more detail in a later publication, is most readily explained as an adaptation to flight in a more rarified atmosphere. It seems not to have been observed in other insects, probably because the enlargement is slight, amounting only to one or two millimeters or to a fraction of a millimeter. One would expect the rarified atmosphere of great elevations also to have the reverse effect on certain heavy bodied insects and to lead to the suppression of flight and its organs altogether. This seems to be actually the case in some alpine beetles, as has been observed by several authors. One might be tempted to explain the aptery of two of the Hidalgo ants (*Monomorium cyaneum* and *M. compressum*) as the result of such an adaptation, were it not that such females occur in several species of this genus (e. g., *M. cecini* Forel and *M. floricola* Jerdon.) that live only at low altitudes in tropical or subtropical countries.

Family FORMICIDÆ.

Subfamily PONERINÆ.

1. *Ponera inexorata* Wheeler.

A single dealated female from San Miguel.

2. *Ponera trigona* Mayr var. *opacior* Forel.

Three workers from Guerrero Mill.

3. *Odontomachus hæmatoda* L. subsp. *clarus* Roger.

Numerous workers, a dealated female and a male found nesting in the soil under stones at San Miguel.

Subfamily DORYLINÆ.

4. *Eciton cæcum* Latr.

Numerous workers and males from Guerrero Mill. The latter were taken at lights.

5. *Eciton (Acamatus) sumichrasti* Norton.

Many workers from several colonies at San Miguel, Pachuca and Guerrero Mill. One large colony was occupying a temporary nest in a bunch of dead cactus.

6. *Eciton (Acamatus) melanocephalum* Emery subsp. *xipe* new subspecies.

Worker.—Length 3–5.5 mm.

Differing from the typical *melanocephalum* only in the following characters: The petiole is nearly twice as long as broad, instead of only slightly longer than broad, the thorax and petiole are dark brownish red, instead of light ferruginous red and the head, except the clypeus, the postpetiole and gaster are black, instead of piceous.

Numerous specimens were taken at San Miguel from a single colony in the act of plundering a nest of *Pheidole vasliti* Pergande var. *acollua* var. nov.

7. *Eciton (Acamatus) manni* new species.

Worker.—Length 3–4.5 mm.

Allied to *E. melanocephalum*. Head somewhat longer than broad, broader in front than behind, with broadly and feebly excised posterior border and angular posterior corners. Eyes very small and indistinct. Mandibles in the largest workers with oblique blades furnished with two or three small, widely separated teeth, in the small workers toothless and not oblique. Antennæ stout, the scapes only about three-fifths as long as the head. Thorax shaped as in *melanocephalum*, long, narrow, laterally compressed; pronotum with a transverse carina anteriorly, pro- and mesonotum feebly convex above and twice as long as the epinotum, the base of which is straight, horizontal and lower than the mesonotum, separated from it by a shallow but distinct impression, and scarcely longer than the declivity which is slightly concavè. Petiole in profile longer than high, evenly convex above, with a small anteroventral tooth; seen from above it is fully twice as long as broad, with parallel sides; postpetiole slightly broader and shorter than the petiole, a little longer than broad, broader behind than in front, with rather straight sides, convex upper surface and a small, blunt, anteroventral tooth. Gaster and legs of the usual shape. Claws simple.

Mandibles subopaque, finely striate and coarsely punctate; head shining, its upper surface in large workers coarsely and sparsely punctate, its lateral and gular surfaces glabrous. Thorax subopaque, finely and densely punctate-rugulose, except the sides of the pronotum, which are very shining and either smooth or very superficially punctate. In the largest workers the inferior meso- and metapleuræ are also somewhat shining and the same is true of the pronotum in all specimens, although this region is as deeply and densely punctate-rugulose as the meso- and epinotum. Petiole finely punctate-rugulose, upper surface of node slightly shining; postpetiole smoother and more shining,

except its ventral surface, which is opaque and finely punctate. Gaster and legs smooth and shining, with small scattered, piligerous punctures.

Hairs pale yellowish, erect, unequal in length, moderately long and abundant, covering the whole body and appendages.

Head and gaster black, front of head and remainder of body dark red; mandibles, middle portions of antennal scapes and of the femora and tibiæ darker and almost black, posterior borders of gastric segments reddish.

Described from several specimens taken from a temporary nest under a stone at Guerrero Mill. This species is readily distinguished from *melanoccephalum* by its much shorter antennal scapes, the coarse punctuation of the dorsal surface of the head in the large worker, the longer petiole and smooth sides of the pronotum in all the workers.

Subfamily MYRMICINÆ.

8. *Pseudomyrma flavidula* F. Smith.

Workers, males and winged females taken from a colony nesting in a grass-culm at San Miguel. These belong to the larger, typical form of the species.

9. *Monomorium minimum* Buckley.

Several workers and dealated females from Guerrero Mill agree very closely with Texan specimens of this form, which should be regarded as a distinct species and not as a variety of *minutum* Mayr. I find that the teeth on the clypeus and the ridges into which they are continued, are much more prominent in both the females and workers of *minimum* than they are in topotypes of *minutum* from Venice, Italy. Moreover the female of *minimum* is winged and has the head subopaque, finely longitudinally striated in front and coarsely punctate above, whereas the corresponding phase of *minutum* is apterous and its head is shorter, more shining, more feebly striated and its punctures much smaller. The thorax of the female *minutum* is distinctly smaller and more slender and the petiolar and postpetiolar nodes much narrower and of a different shape, the petiole being epedunculate, whereas it is distinctly pedunculate in *minimum*. The peduncle of the petiole is very short also in the worker of *minimum*. Besides the two following subspecies what I have called the subsp. *ergatogyna* from Santa Catalina Island, Cal., should also be attached to *minimum* and not to *minutum*. Both of these species differ from *carbonarium* F. Smith and its subsp. *ebeninum*

Forel in the shape of the epinotum, as Forel has shown. In the two former species it is sloping and rounded and not cuboidal. *Minimum* and *minimum* nest in the ground under stones, *carbonarium* and *cbeninum* in the cavities of plants (twigs, under bark, between the overlapping leaves of Tillandsias, etc.).

10. *Monomorium minimum* subsp. *cyaneum* new subspecies.

Worker.—Differing from the worker of the typical form in coloration, the body being deep, metallic blue; the antennæ and legs black, with the bases of the funiculi, mandibles, mouthparts, tarsi and articulations of the legs piceous.

Female.—Apterous, but with the thorax shaped very much as in the typical *minimum* though distinctly smaller and more slender. Head more shining above. Body and legs black, the latter with yellow articulations and tarsi.

Described from numerous workers and females taken at Guerrero Mill under stones in rather damp places on the sides of canyons.

11. *Monomorium minimum* subsp. *compressum* new subspecies.

Worker.—Indistinguishable from that of the typical *minimum*.

Female.—Smaller, less than 3 mm. long; apterous and more worker-like in the structure of the thorax than the subsp. *cyaneum* and *ergatogyna* Wheeler, the mesonotum and scutellum very small. Moreover the thorax is distinctly constricted both dorsally and laterally just in front of the epinotum. The mesoëpinotal suture is deep, the epinotum rather swollen, longitudinally impressed in the middle and in profile shaped like that of the worker. Head rather short, more shining than in the typical *minimum* and the punctures smaller than in this form and in *cyaneum*; petiole narrower. Pilosity white, much shorter and very much sparser.

Described from four females and several workers taken at San Miguel beneath a stone. This may be a distinct species, but its exact position can hardly be determined till its male and those of the allied forms have been carefully studied.

12. *Solenopsis picea* Emery.

A dozen workers taken from nests under stones at Guerrero Mill are referable to this form, which was originally described from Costa Rica.

13. *Solenopsis minutissima* Emery.

Several workers from a rather large colony found nesting under a stone at San Miguel agree very closely with some Argentine cotypes of this species given me by Dr. F. Silvestri. One of the workers is larger and has larger, distinctly pigmented eyes, but is probably

an unusual specimen. Three dealated females accompanying these workers measure a little more than 3 mm. and are rich chestnut brown, with yellow legs and antennæ. The upper surface of the head and anterior portion of the mesonotum are coarsely and sparsely punctate. The petiolar and postpetiolar nodes are of subequal width, but the latter is proportionally shorter and fully twice as broad as long. The postpetiole bears a small but prominent tooth on its ventral surface. The gaster is long and narrow.

14. *Cremastogaster lineolata* Say subsp. *opaca* Mayr.

Several workers taken from colonies nesting under large flat stones at San Miguel agree very closely with Mayr's description of the typical form of this subspecies. They are very dark in color and lack the denticles which occur on the petiole in *dentinodis* Forel, a form which I took many years ago at Queretaro, Mexico. Several males, accompanying the workers from San Miguel, measure about 3.5 mm. They closely resemble the male of the typical *lineolata* of the Northern States in form, sculpture and pilosity, but are somewhat darker.

15. *Pheidole chalca* new species.

Soldier.—Length 2.5–3 mm.

Allied to *Ph. floridana* Emery. Head subrectangular, a little longer than broad, with straight, parallel sides and rounded posterior lobes, separated by a deep excision, and with a distinct median dorsal groove continued forward as far as the frontal area. Mandibles convex, with two blunt apical teeth. Clypeus concave and carinate in the middle, its anterior border feebly notched in the middle. Eyes rather large, flat, at the anterior third of the head. Frontal area distinct. Frontal carinæ rather long, forming the mesial borders of very feeble but distinct impressions for the antennal scapes. Antennæ slender, scapes reaching only a short distance behind the eyes; funicular joints 2–8 small, not longer than broad. Thorax robust, shorter than the head and through the humeri more than half as broad. In profile the pro- and mesonotum form a single convex mass, the mesonotum angular and falling rather abruptly behind to the epinotum which is small and has a subequal base and declivity, the latter sloping, the spines small, acute, suberect, longer than broad at their bases. Petiole nearly twice as long as broad, a little broader behind than in front, with concave sides; in profile with both anterior and posterior slopes of the node concave, the node transverse and with rather sharp, feebly notched superior border. Postpetiole nearly $1\frac{1}{2}$ times as broad as the petiole, distinctly broader than long, with its sides in the middle distinctly angular but not conulate. Gaster much smaller than the head.

Whole body shining; mandibles sparsely but not coarsely punctate. Sides

of the clypeus and anterior $\frac{3}{4}$ of head above, except the flattened areas for the scapes, longitudinally rugose. Epinotum and pleuræ obscurely rugulose; sides of epinotum and sides and ventral surface of petiole densely punctate. Remainder of thorax and gaster with minute, sparse, piligerous punctures.

Hairs coarse, yellow, moderately long, suberect on the body, shorter and subappressed on the scapes and legs.

Brownish yellow; borders of mandibles, clypeus, gaster, except its base and tip, and head, except the cheeks and posterior corners, brown. In some specimens the upper surface of the thorax also is infuscated.

Worker.—Length 1.5–2 mm.

Head subrectangular, excluding the mandibles as broad as long, with the posterior border feebly excised in the middle. Eyes just in front of the median transverse diameter of the head. Mandibles with about 5 denticles. Antennal scapes reaching the posterior border of the head. Clypeus convex, its anterior border rounded and entire. Thorax like that of the soldier, but the pro- and mesonotum less robust, less convex and more evenly rounded in profile and the epinotal spines smaller. Petiole with entire, rather conical node; postpetiole a little broader than long, broader behind than in front, its sides not angulate.

Head thorax and pedicel covered with small, dense punctures and the front of the head also delicately longitudinally rugulose so that it is subopaque. The thorax and pericel, too, are subopaque, except the upper surface of the pronotum and the nodes which are more or less shining.

Pilosity much as in the soldier.

Color brownish yellow, dorsal surface of the head, thorax and gaster often a little darker.

Female.—Length 4.5–5 mm.

Head subrectangular, as broad as long, a little broader behind than in front, the posterior border nearly straight. Thorax seen from above elliptical, but narrowed in the epinotal region, which is sloping in profile, with stout, short, pointed teeth. Petiolar node emarginate. Postpetiole nearly twice as broad as long, its sides in the middle produced as blunt conules. Gaster broadly elliptical. Wings very long (7.5 mm.).

Mandibles rather shining, coarsely striato-punctate; clypeus and head subopaque, longitudinally rugose and reticulate even on the depressions for the antennal scapes. Pronotum opaque and rugulose. Remainder of thorax shining, but with the sides and dorsal surface coarsely punctate and striate. Petiole and postpetiole less shining than the gaster, with coarse piligerous punctures. Gaster sparsely and minutely punctate, with large punctures on the extreme base of the first segment.

Hairs longer and more abundant than in the soldier.

Dark piceous brown or black; mandibles, except their borders, clypeus, cheeks, legs and bases and tips of antennal funiculi brownish yellow, the middle portions of the tibiae and femora darker. Wings gray, with pale brown veins and stigma.

Described from numerous specimens taken from many colonies of

rather small size nesting beneath stones at Guerrero Mill. This species is evidently closely related to *Ph. floridana*, but the head of the soldier is larger, less flattened, the thorax is stouter, with smaller epinotal spines, the postpetiole is decidedly narrower and the sculpture is very different both in the soldier and worker. The worker of *chalca*, moreover, is much more robust than that of *floridana* and its various subspecies and varieties, and the pilosity is very different, being like that of the soldier and not consisting of very sparse, feebly clavate hairs on the body.

16. *Pheidole ceres* Wheeler subsp. *tepaneca* new subspecies.

Soldier.—Differing from the typical form from Colorado in the darker color of the head, thorax and gaster, which are black and not dark brown, and in the sculpture of the head and thorax, especially the posterior lobes of the former and the pronotum, which are more glabrous and shining. The rugæ on the anterior part of the head are sharper and more nearly straight and the interrugal spaces are finely and densely punctate and much less distinctly reticulate.

Worker and female differing from those of the typical *ceres* also in their darker color and more shining surface.

A few soldiers and females and many workers of this harvesting ant were taken from small colonies under stones at Guerrero Mill.

17. *Pheidole* (*Allopheidole*) *centeotl* new species.

Soldier.—Length 4 mm.

Allied to *Ph. macclendoni* Wheeler. Head very large, including the mandibles fully twice as long as the thorax, longer than broad, rather flat, especially behind, as broad in front as behind, with straight sides and rounded posterior lobes, separated by a deep angular excision and with a pronounced middorsal groove continued forward to the frontal area. Eyes small, rather flat, at the anterior fourth of the head. Mandibles convex, with two blunt apical teeth. Clypeus very short, carinate, with the posterior margin deeply impressed and the anterior margin narrowly notched in the middle. Frontal area small, triangular, rather deeply impressed, with a median carinula. Frontal carinæ short, diverging posteriorly. Antennæ small and slender; scapes reaching only a short distance behind the eyes, terete, slightly curved at the base, funicular joints 2-8 as long as broad. Thorax small, less than half as broad as the head, with bluntly rounded humeri. In profile the pro- and mesonotum form a single convex mass, the mesonotum having a plain surface, without transverse constriction or welt, sloping to the epinotum, which has a subequal base and declivity, the former horizontal, the latter very sloping, armed with two small, erect teeth, which are as long as broad at the base. Petiole from above fully twice as long as broad, with subparallel sides; in profile the node is moderately

high and transverse, with long, concave anterior and short, abrupt, posterior slope, its border entire and evenly rounded. Postpetiole twice as broad as the petiole, decidedly broader than long, with each side produced in the middle as a distinct, pointed conule. Gaster elliptical, much smaller than the head. Legs rather long and slender.

Body shining; clypeus and anterior half of head rather coarsely longitudinally rugose, the spaces between the rugæ feebly reticulate. Mandibles and posterior half of head with scattered, piligerous punctures. Thorax, pedicel and gaster also with similar punctures, but the pleuræ irregularly rugulose and the epinotum subopaque, densely and superficially punctate.

Hairs yellowish, erect or suberect, delicate, moderately long and abundant, covering the body, scapes and legs.

Ferruginous; borders of mandibles, sides of the clypeus, the median longitudinal groove of the head, the mesonotum, epinotum, pedicel and gaster dark brown or blackish.

Mediae.—Length 2.5–3.5 mm.

Representing a series of intermediates between the soldier and worker in the size and sculpture of the head and in the size and shape of the body.

Worker.—Length 2–2.5 mm.

Head, excluding the mandibles, subrectangular, as broad as long. Mandibles with 5 or 6 denticles. Clypeus rather convex, with entire anterior border. Eyes just in front of the middle of the head, moderately convex. Antennal scapes scarcely surpassing the posterior corners of the head. Thorax like that of the soldier. Postpetiole nearly as long as broad, its sides in the middle distinctly angular, but not produced or conulate.

Shining; anterior half of head and the whole thorax subopaque and densely punctate, the cheeks and front also longitudinally rugose; pronotum smooth and shining above.

Pilosity similar to that of the soldier but shorter.

Black; antennæ and legs piceous; mandibles, bases of funiculi, tarsi and articulations of legs yellowish.

Female.—Length 5.5–6 mm.

Head rectangular, not longer than broad. Eyes rather large and convex. Thorax of the usual shape, with flat mesonotum and scutellum; epinotum sloping, without distinct base and declivity, armed with two short, acute teeth, which are very broad at their bases. Petiole and postpetiole like those of the soldier. Gaster broadly elliptical. Wings very long (10 mm.).

Shining and with sparse, minute, piligerous punctures; mandibles more coarsely punctate; sides of clypeus and anterior $\frac{3}{4}$ of head subopaque, longitudinally rugose.

Pilosity much as in the soldier but more appressed on the thorax and gaster.

Dark brown; mandibles, except their borders, which are black, clypeus, cheeks, pronotum, pleuræ, antennæ and legs reddish or ferruginous. Wings gray, with pale brown veins and stigma.

Described from many specimens taken from a number of colonies nesting beneath stones on the hill sides at Guerrero Mill. This species differs from *Ph. macclendoni* in its smaller stature and in the head of the soldier, which in the latter species is proportionally shorter, much more convex above and very differently sculptured. I have named it after the Aztec Ceres, or maize goddess, as it is, in all probability, a harvesting species. Owing to the structure of the head and the polymorphism of the worker phase it may be referred to Forel's subgenus *Allophcidole*, which also includes *Ph. macclendoni*, *tepicana* Pergande and *kingi* Ern. André, the last being the type. *Ph. vasliti* Perg., which Forel also assigned to this subgenus must evidently be excluded. For reasons given below I make it the type of a new subgenus, *Cardiophcidole*. Both of these subgenera, however, seem to be rather artificial and therefore of doubtful value.

18. *Pheidole* (*Cardiophcidole*) *vasliti* Pergande var. *acoluha* new var.

Soldier.—Differing from the typical form and the var. *hirtula* Forel in its darker color, the gaster, pedicel, pleuræ, epinotum and femora, and in some specimens also the remainder of the thorax and the head, dark brown or black in mature specimens, the cheeks sometimes red or yellowish.

Mediæ and worker.—These are also darker than the corresponding phases of the typical form and var. *hirtula*, the mediæ being piceous or blackish, with red mandibles and cheeks, the worker black, with yellowish mandibles and brownish funiculi, tarsi and articulations of the legs.

Female.—Length 8-9 mm.

Head, excluding the mandibles, subrectangular, a little broader than long, a little broader behind than in front. Anterior clypeal border transverse, flattened, deeply emarginate in the middle. Antennal scapes reaching nearly to the posterior corners of the head, flattened and somewhat incrassated and rather strongly curved at the base. Thorax of the usual shape, with broad, flat mesonotum and sloping epinotum, the latter armed with strong, blunt, laterally compressed teeth. Petiole from above concave on the sides, broadest behind through the node, which is transverse, with a sharp border, excised in the middle and with rather straight sides above. Postpetiole seen from above, about twice as broad as long, with broadly rounded anterior border, its sides in the middle projecting as blunt angles. Gaster broadly elliptical, flattened dorso-ventrally. Wings very long (9-10 mm.).

Mandibles shining, coarsely and very sparsely punctate. Middle of clypeus and a narrow median line on the head shining, sides of clypeus and remainder of head subopaque, coarsely longitudinally rugose, with reticulate interrugal spaces. Thorax and pedicel subopaque, finely striate and coarsely punctate, middle of the mesonotum, anterior portion of scutellum and gaster shining, covered with scattered piligerous punctures.

Hairs on the body sparse, long, erect; on the legs and scapes shorter, more abundant and more reclinate.

Black; mandibles, except their borders, cheeks, antennal funiculi and legs red; femora darker. Wings gray, with yellow veins and brown stigma.

Male.—Length 5–6 mm.

Head very small; cheeks very short; mandibles minute, bidentate; eyes large, half as long as the sides of the head. Antennæ slender; scapes very short, not longer than the second and succeeding joints of the funiculi, first funicular joint subglobular. Thorax robust, nearly twice as broad as the head; mesonotum convex in front, flattened behind; epinotum with subequal base and declivity and a blunt angular projection on each side in the place of the spine. Petiole like that of the soldier, with sharp, emarginate superior border. Post-petiole subcampanulate, broader behind than in front, with feebly rounded sides. Gaster elliptical. Legs very slender. Wings rather broad.

Head, thorax and pedicel subopaque, densely and finely punctate-regulose. Gaster shining, with minute, sparse, piligerous punctures.

Hairs grayish yellow, erect, long and very abundant on the head, thorax and petiole, much sparser on the gaster, shorter and more appressed on the legs.

Black; mandibles and tarsi, except the first joint, yellowish. Wings colored as in the female.

Described from a large number of specimens taken from many colonies at San Miguel, Pachuca and Guerrero Mill. These colonies are often very populous and nest under stones in open, arid situations. There are also in my collection many specimens of this same variety from Saltillo and Guadalajara, Mexico, taken several years ago by Dr. J. F. McClendon.

Great confusion is apparent in the literature in regard to *Ph. vasliti* and certain other forms described by Pergande as *Ph. subdentata* and *obtusospinosa* and by Santschi as *Ph. arizonica*. As I have on hand a considerable number of specimens referable to these forms, I am able to state that Forel has confounded two very distinct subspecies, one of which was originally described by Pergande from Lower California. The worker of the other was described by Pergande as *subdentata* from Tepic, Mexico, and the corresponding soldier from the same locality was described by the same author as *Ph. obtusospinosa*. Finally Santschi described what is nothing more than a dark variety of *subdentata* from Tucson, Arizona as *Ph. arizonica*. I have been able to reach these conclusions from a study of cotypes of *subdentata* and *obtusospinosa* in my collection and numerous topotypes of *arizonica* collected by myself a few years ago in the Santa Cruz River bed at Tucson, Arizona.

The soldiers of the two subspecies and their varieties may be distinguished by means of the following table:

1. Head of soldier cordate, narrowed anteriorly, with slightly concave cheeks and convex front; mandibles without a deep longitudinal impression at the apex between the two teeth; postpetiole fully twice as broad as long 2.
 Head of soldier less narrowed anteriorly and less convex in the frontal region; cheeks not concave; mandibles with an elongate and rather deep, longitudinal impression at the apex between the two teeth; postpetiole not twice as broad as long 4.
2. Color pale brown or reddish, gaster shining; length 3.8-4.4 mm.,
Ph. vasliti Pergande.
 Color darker; gaster subopaque; pilosity more abundant; length 6-7 mm. 3.
3. Gaster black, head and thorax often dark brown or blackish,
var. acolhua var. nov.
 Color somewhat lighter *var. hirtula* Forel.
4. Color paler subsp. *subdentata* Pergande.
 Color darker *var. arizonica* Santschi.

The synonymy and distribution of these forms is as follows:

***Pheidole vasliti* Pergande**, Proc. Cal. Acad. Sci. (2), V, 1895, p. 883, ♀♂;
 Forel, Biol. Centr. Amer., 1889-90, p. 65.

Ph. obtusospinosa Forel (*nec* Pergande) Ann. Soc. Ent. Belg. XLV, 1901, p. 130.

Sierra San Lazaro, Lower California (Eisen and Vaslit).

***Ph. vasliti* var. *hirtula* Forel**, Biol. Centr. Amer. 1889-90, p. 65, ♀♂; Ann. Soc. Ent. Belg. XLV, 1901, p. 130, ♀♂; Wheeler, *ibid.* p. 202, ♀♂.

Durango (Brinkmann); Queretaro (Wheeler); Zapotlan, Jalisco (C. H. T. Townsend).

***Ph. vasliti* var. *acolhua* new var.**

State of Hidalgo (W. M. Mann); Saltillo and Guadalajara (J. F. McClendon).

***Ph. vasliti* subsp. *subdentata* Pergande.**

Ph. subdentata Pergande, Proc. Cal. Acad. Sci. (2) V, 1895, p. 888, ♀.

Ph. obtusospinosa Pergande, *Ibid.* p. 889, ♀.

Tepic, Mexico (Eisen and Vaslit); Rio Santiago (J. F. McClendon).

***Ph. vasliti* subsp. *subdentata* var. *arizonica* Santschi.**

Ph. arizonica Santschi, Bull. Soc. Ent. Ital. XLI, 1909, p. 3, ♀.

Tucson, Arizona (F. Silvestri); Bed of Santa Cruz River, Tucson (Wheeler); Huachuca Mts., Arizona (Wheeler and W. M. Mann).

Ph. vasliti is certainly much more closely related to the series of forms embracing *Ph. texana* Wheeler, *hyatti* Emery, *crassicornis*, Emery, etc. than to *Ph. kingi*, *rugifrons*, etc. This latter group is much more closely related to our typically nearctic series of Pheidoles, including *Ph. pilifera* Roger, *vinelandica* Forel, etc. Hence I am unable to follow Forel in including *vasliti* in the subgenus *Allophidole*, merely because it possesses polymorphic, instead of dimorphic workers. In order to emphasize this conclusion I have placed it in a distinct subgenus.

19. *Stenamma manni* new species.

Worker.—Length 2.5–3.5 mm.

In the shape of the body very much like *S. westwoodi* Westwood and *brevicorne* Mayr, but the eyes are much larger and the basal joint of the funiculi a little longer and less transverse. Sculpture of the head, thorax and pedicel a little finer and more as in the subsp. *diecki* Emery of the latter species, so that the surface, especially of the pronotum and posterior portion of the head, is somewhat shining. Pilosity much as in the other species of the genus, but the color is very different, being black, with the tarsi, articulations of the legs, the mandibles and tips of the antennæ, dark red.

Female.—Length 4.2 mm.

Closely resembling the worker, except for the usual sexual differences. Wings distinctly infuscated, with the inner branch of the cubital vein arising from the cubital cell a short distance proximal to the cross-vein. The venation is therefore intermediate between that of *S. nearcticum* Mayr and *westwoodi* on the one hand and *brevicorne* on the other, since in the two former species the inner branch of the cubital arises at a point just distal to the cross-vein, whereas in the latter it arises from the middle of the cubital cell. The veins and stigma are, moreover, dark brown in color, but very pale in *nearcticum* and *brevicorne* and only slightly darker in *westwoodi*.

Described from two females and 13 workers taken from a couple of colonies, which were nesting under large stones in a damp spot in the pine forest on the trail between Real del Monte and El Chico at the summit of the range (10,000 to 11,000 ft.).

20. *Pogonomyrmex barbatus* F. Smith.

Several workers, three males and a dealated female from Pachuca are referable to this form. The workers measure 5.5–6 mm., and are

distinctly smaller and perhaps a little darker than the workers of the var. *molefaciens* Buckley from Texas, but the male has the head, thorax and node of the petiole black, whereas these parts are reddish yellow like the rest of the body in *molefaciens*. Moreover the wing-veins and stigma are brown and not resin yellow as in the Texan variety. In the female the epinotal spines are as long and slender as in the worker, but in *molefaciens* they are very short and broad at the base. The color of this sex is the same as that of the female *molefaciens*.

At Pachuca *P. barbatus* inhabits large, flat, crater nests about 4 feet in diameter in the open, arid country.

21. *Myrmica mexicana* new species.

Worker.—Length 3.5–5 mm.

Closely allied to the European *M. sulcinodis* Nyl. Head distinctly longer than broad. Antennal scapes shaped like those of *sulcinodis* or rather of the var. *sulcinodis-scabrinodis* Forel, being a little more sharply bent at the base and in some specimens with a small tooth or ridge at the angle as in some forms of *scabrinodis*. The joint is of nearly uniform thickness throughout. Funiculi with a 3-jointed club, which in some specimens, seems to be indistinctly 4-jointed. Spines of the epinotum straight or very slightly bent downward, somewhat shorter than those of *sulcinodis* and not recurved at their tips. Petiole in profile a little longer than high, shaped as in *sulcinodis*. not pedunculate, its node with subequal declivities, the anterior feebly concave, the posterior feebly convex, both meeting at a rather sharp angle. Postpetiole also as in *sulcinodis*, distinctly higher than long.

Sculpture very coarse and much as in *sulcinodis*, with shining interrugal spaces, but the longitudinal trend of the rugæ is not so distinct on the thorax and pedicel, often vermiculate on the thoracic dorsum and the nodes. Frontal area rugose, opaque.

Hairs like those of *sulcinodis*, but of a gray instead of a yellow tint.

Deep cherry red, legs a little darker; gaster, clypeus and anterior half of head, black. In many specimens the whole head and thorax are dark brown or blackish.

Female (deâlated).—Length 5.5 mm.

Closely resembling the worker and differing greatly from the female *sulcinodis* in color, being like the darkest workers, with the upper surface of the thorax and the whole head blackish.

Male.—Length 5–5.5 mm.

Differing from the male of *sulcinodis* in its larger size and in color, the body being deep black, with only the legs and genitalia piceous, and the 4-jointed clubs of the antennæ and tips of the mandibles clear yellow. The wings are more grayish and longer (6 mm.), whereas those of *sulcinodis* measure

less than 5 mm., and the veins and stigma are of a deeper brown tint. The antennal scapes resemble those of *sulcinodis*, being fully half as long as the funiculi, but are somewhat stouter, especially at the base. There are no appreciable differences in pilosity between the two forms. In sculpture the following differences may be noted: the petiolar node is irregularly rugulose-punctate, not longitudinally rugose as in *sulcinodis*, and the postpetiole is also smoother and more shining; the fine rugæ on the head are more irregular and not longitudinal.

Described from many workers and males and three females taken from several colonies at Guerrero Mill. These colonies were found under stones both in the pine woods and on open hill-sides. The status of this form is somewhat doubtful, as one may be inclined to regard it as a subspecies of *sulcinodis*. It is certainly singular that it should be more closely related to the European *sulcinodis* than to any of the nearctic *Myrmicas*, except *M. punctiventris* Roger. Even *M. brevinodis* Emery, although it has varieties (*subalpina* Wheeler and *sulcinodoides* Emery) that approach the European form in sculpture and color, differs considerably from *sulcinodis* in the antennal scapes of the worker and male. The Mexican form is closely related to *M. punctiventris* of the Eastern States. In the worker of this species, however, the petiole is pedunculate and has a larger antero-ventral tooth, the epinotal spines are shorter, the antennæ are less angularly bent at the base and the gaster is coarsely punctate. The male *punctiventris* is much smaller than that of *mexicana*, but in other respects remarkably similar.

22. *Leptothorax manni* new species.

Worker.—Length 2–2.2 mm.

Head subrectangular, longer than broad, with broadly rounded posterior border. Mandibles 5-toothed. Clypeus convex, its anterior border very feebly and sinuately emarginate in the middle. Frontal area distinct. Antennæ 12-jointed; scapes reaching very nearly to the posterior border of the head; first funicular joint as long as joints 2–5 together; joints 2–6 a little broader than long, 7 and 8 as long as broad; terminal longer than the two penultimate joints of the 3-jointed club. Thorax flattened above and on the sides, a little narrower behind than in front, not constricted when seen from above and without impressed sutures on the dorsal surface, which, therefore, in profile is perfectly even and nearly straight. Humeri rather prominent, subangular; base and declivity of epinotum in profile subequal, the latter sloping, armed with two small, suberect teeth, which are not longer than broad at their bases. Petiole subpedunculate, seen from above pyriform, broader behind than in

front, about $1\frac{1}{2}$ times as long as broad; in profile the anterior and posterior declivities of the node are subequal, the former straight or very feebly concave, the latter convex. Postpetiole nearly half again as broad as the petiole, broader than long, subrectangular, with rounded anterior corners. Gaster elongate elliptical, with feebly excised anterior border. Femora slightly swollen in the middle.

Mandibles subopaque, coarsely striatopunctate. Cheeks, pleuræ, epinotum, petiole and postpetiole subopaque, finely and densely punctate; cheeks and clypeus also delicately longitudinally rugulose; remainder of body very smooth and shining, finely and very sparsely punctate, especially the posterodorsal portion of the head, the pronotum and the gaster.

Hairs snow white, short, delicate but clavate, sparse and erect on the body; on the appendages very minute, appressed and pointed.

Black; antennæ and legs deep red or piceous, scapes and middle portions of femora and tibiæ darker. In some specimens the tarsi and articulations of the legs are more yellowish.

Female.—Length 3–3.5 mm.

Differing from the worker in the following particulars: Head broader and somewhat more rectangular. Thorax large, subelliptical from above and flattened dorsally, the mesonotum large, the base of the epinotum only half as long as the declivity, which is abrupt and concave. Petiole in profile with wedge-shaped node, its anterior slope short and slightly concave, its posterior slope straight and perpendicular, its superior border rounded and entire. Postpetiole more distinctly rectangular than in the worker, nearly twice as broad as long, very convex above and in front, depressed behind.

Sculpture much as in the worker, but the front of the head longitudinally striated and the nodes of the petiole smoother and more shining.

Pilosity and color as in the worker, except that the hairs on the body are pointed. Wings whitish hyaline, with pale yellow veins and conspicuous brown stigma.

Male.—Length 2 mm.

Head through the eyes as broad as long, semicircular behind. Mandibles small. Antennæ short; scapes only about three times as long as the first funicular joint, which is oval and less than twice as long as broad. Eyes large and prominent. Thorax nearly as broad as long; mesonotum convex; epinotum depressed, sloping and unarmed. Petiole and postpetiole like those of the worker; legs more slender.

Whole head subopaque, densely and finely punctate-rugulose. Remainder of body shining; thorax above finely longitudinally striated.

Hairs very short and sparse, pointed.

Color like that of the worker and female. Veins of wings very pale; stigma as in the female, large, dark brown and conspicuous.

Described from numerous workers and females and a single male taken from nests in the ground beneath stones at El Chico and

Guerrero Mill. This species is most closely related to *L. schmitti* Wheeler of Colorado, but the worker is readily distinguished by its much darker color, shorter head, shorted epinotal spines and very different petiolar node. The new species also bears a superficial resemblance to *L. stolli* Forel, known only from the summit of the Volcan de Agua, in Guatemala (13,000 ft.), but the worker of this species is larger (nearly 3 mm. long), has a longer head and the thorax is more rounded and not prismatic.

Subfamily DOLICHODERINÆ.

23. *Tapinoma sessile* Say.

Numerous workers and dealated females from San Miguel and Guerrero Mill agree very closely with our large, common North American form of this species.

24. *Liometopum apiculatum* Mayr.

Many workers and two males from Guerrero Mill and Pachuca.

Subfamily CAMPONOTINÆ.

25. *Prenolepis (Nylanderia) vividula* Nylander.

Several workers from San Miguel.

26. *Prenolepis (Nylanderia) mexicana* Forel.

Many workers, three females and a single male from nests in the soil beneath stones at Guerrero Mill. The hitherto undescribed female measures 4.5–5 mm. and is very dark brown, with the funiculi, tarsi and articulations of the legs yellowish and the wings rather deeply infuscated, with brown veins and stigma. The pilosity is similar to that of the worker, but the pubescence is gray, rather long and very dense, covering the whole body so that it is opaque and not shining as in the worker.

27. *Lasius (Acanthomyops) interjectus* Mayr subsp. *mexicanus* new subspecies.

Worker.—Differing from the worker of the typical form from the United States in its smaller size (only 2.7–3.3 mm., whereas the typical *interjectus* measures 3.5–4 mm.), and in having the long hairs on the body somewhat finer and less flexuous.

Female.—Not darker than the worker and much smaller than the typical form (length 4.5–5 mm. as compared with 6.5–7 mm. in the true *interjectus*),

with much shorter and fewer erect hairs on the thorax and gaster, with long, distinct pubescence on the mesonotum, which is glabrous and without pubescence in the type. The pubescence on the gaster is also much denser so that it nearly conceals the surface. Wings paler, with paler veins and stigma, and proportionally longer, measuring 7 mm., compared with 7.5 mm. in the typical *interjectus*.

Male.—Also smaller than the corresponding sex of the typical *interjectus* (3 mm.). Body darker and more opaque, much less hairy, but with more abundant pubescence, especially on the upper surface of the epinotum.

Described from numerous workers, females and males, taken from large colonies near Guerrero Mill. These were nesting beneath large stones, especially in pine woods and at high altitudes. The males and females were captured during May, whereas those of the typical *interjectus* are not found in the United States till later in the summer (from the middle of July till the middle of September).

28. *Formica microgyna* Wheeler subsp. *rasilis* Wheeler var. *nahua* Wheeler.
Workers and females from Guerrero Mill.

A full account of this and the three following *Formicas* is given in my recent "Revision of the Ants of the Genus *Formica* (Linné) Mayr," Bull. Mus. Comp. Zool., LIII, 1913, pp. 562 *et seq.*

29. *Formica subcyanea* Wheeler.

Workers, females and males from Guerrero Mill, Velasco, below Real del Monte; El Chico and Pachuca.

30. *Formica rufibarbis* Fabricius var. *gnava* Buckley.

Workers, females and males from Guerrero Mill and El Chico.

31. *Formica cinerea* Mayr var. *altipetens* Wheeler.

A few workers from Pachuca.

32. *Polyergus rufescens* Latreille subsp. *breviceps* Emery var. *montezuma* new var.

Worker.—Very similar to the typical *breviceps* of Colorado, but differing in coloration, the general tint of the body being slightly darker and more brownish red, with the legs, the posterior border of the first gastric segment broadly and the succeeding segments entirely fuscous. The pilosity is fully as abundant as in the typical *breviceps*, differing in this respect from *mexicanus* Forel, which is scarcely more than a variety, if indeed it be not a synonym of *breviceps*.

Female.—Colored like the worker, but the general tint of the body even darker. Veins and stigma of the wings also darker than in the female *breviceps*.

Male.—Indistinguishable from the male of the typical *breviceps*.

Described from several workers, a male and a female belonging to a single colony which was taken at Pachuca. The slaves in the nest were *Formica subcyanea* Wheeler.

33. *Myrmecocystus mexicanus* Wesmael var. *melanoticus* new var.

Worker.—Differing from the typical *mexicanus* in color, the body being deep fuscous, the gaster nearly black, the legs, antennæ, mandibles, clypeus and cheeks yellowish brown.

Male.—Length 5.5 mm.

Like the male of the var. *hortideorum* McCook, but of a different color, the body being black, the genitalia, antennæ and legs deep fuscous or piceous. The wings are longer (6.5 mm., those of *hortideorum* are less than 6 mm.), without a discal cell.

Described from eight workers and a male taken at Pachuca. This is a very distinct variety, as the worker is much darker in color than in any of the other forms of *mexicanus* and therefore bears a superficial resemblance to the following species.

34. *Myrmecocystus melliger* Forel.

Several rather small workers taken from small crater nests at Pachuca either belong to the typical form of this species or to a very closely related variety.

35. *Camponotus maculatus* Fabricius subsp. *picipes* Olivier.

Many workers, males and winged females from Pachuca, San Miguel and Guerrero Mill, belonging to the common Mexican form of this subspecies which was redescribed many years ago by Forel (Bull. Soc. Vaud. Sc. Nat., XVI, 1879, p. 67). In the workers more or less of the thoracic dorsum, especially in front, is dark brown or blackish. The wings of the female are very long (15–16 mm.). Mr. Mann informs me that this ant is very common throughout the mountains of Hidalgo, nesting in the ground under stones, like other races of *maculatus*.

36. *Camponotus maculatus* subsp. *picipes* var. *pudorosus* new var.

Worker major.—Length 6.5–7 mm.

Differing from the typical *picipes* in its smaller size, in sculpture and coloration. The head is distinctly shining and much more finely and superficially shagreened, and the dorsal surface of both the head and thorax is paler in color. The base of the first gastric segment is yellow like the petiole and legs. The tibiæ of the latter are only a little darker than the femora and therefore much paler than in *picipes*. The pilosity is like that of the sub-specific type.

Worker minor.—Length 4.5–5 mm.

Very similar to the worker major in color and sculpture, but the head is pale brown.

Female.—Length about 8.5 mm.

Body smaller, head more shining and more superficially sculptured than in the female *picipes*. Head, thoracic dorsum and the whole gaster black; epinotum, tibiae and tarsi brown, pleurae, femora and petiole yellow. Wings long (12.5 mm.), brownish yellow, with resin yellow veins and brown stigma.

Male.—Length 6.5 mm.

Differing from the male of the typical *picipes* only in its smaller size.

Described from numerous workers, a male and female, from nests under stones at Guerrero Mill.

37. *Camponotus nitidus* Norton var. *nuperus* new var.

Worker major.—Length 6–6.5 mm.

Head rather small, excluding the mandibles a little longer than broad, a little narrower in front than behind, with rounded sides, posterior border and posterior corners, convex above, with large, flattened eyes situated just behind the median transverse diameter of the head. Mandibles short, with 5 sub-equal teeth. Clypeus strongly carinate, its median portion as broad as long, with its anterior lobe very short, rounded and entire. Frontal area distinct, large and triangular. Frontal carinae straight, strongly diverging. Frontal groove distinct, a little longer than the frontal carinae. Antennal scapes slender, terete, slightly curved at the base and feebly and gradually thickened towards their tips, reaching fully one-third their length beyond the posterior border of the head. Thorax short, laterally compressed, especially behind, feebly and regularly arcuate above in profile, but the epinotum with its straight base forming a rather sharp ridge, shorter than the declivity and making with it nearly a right angle, as the declivity is nearly perpendicular and distinctly concave. Promesonotal and mesoepinotal sutures pronounced. Petiole small, nearly as broad as the epinotum, but much lower, in profile cuneate, thick at the base, with convex anterior and flat posterior surface and the superior border sharp, entire and evenly rounded when seen from behind. Gaster of the usual shape; legs rather long.

Shining throughout; mandibles densely striato-punctate, smoother at the base; remainder of body smooth and very finely shagreened; clypeus and cheeks with large, shallow, sparse punctures.

Hairs golden yellow, erect, very sparse on the clypeus, front, vertex and gaster, absent on the thorax, petiole and appendages, except at the tips of the scapes and on the knees, where there are a few small hairs. Pubescence extremely fine and dilute, visible only on the pleurae, epinotum and venter.

Yellow; gaster, posterior portion of head, front, tips of mandibles and clouds on the thoracic dorsum dark brown, posterior borders of gastric segments paler. Antennae reddish brown. In some specimens the anterior portion

of the head is also brown but of a lighter tint than the portion behind the eyes.

Worker minor.—Length 5–5.5 mm.

Differing from the worker major only in its somewhat smaller size and the somewhat more elongate head, with less convex sides.

Female.—Length 6.5 mm.

Also very much like the worker major, but the head is distinctly longer and narrower and the cheeks are nearly straight. Scutellum with a few erect hairs. Wings very long (9 mm.), slightly infuscated, with brown veins and stigma.

Described from eleven workers and a single female taken at Guerrero Mill from a colony nesting in the trunk of a live oak. I have described this form at length because of the meagreness of Norton's original description of *nitidus* (Proc. Essex Inst. 1868, p. 2) which was based on three minor workers "from the mountains of Orizaba", where the species lives in "little companies under the bark of pines" (Amer. Natur. II, 1868, p. 60). It was more fully characterized by Forel (Bull. Soc. Vaud. Sc. Nat. XVI, 1879, p. 82). The specimens from Hidalgo evidently represent a distinct variety as their thorax is much paler than in the typical form, judging from Norton's description. Comparing them with a few cotypes of *C. montivagus* Forel taken by Stoll at Tecpam, Guatemala (7,000 ft.), I find that the latter is scarcely more than a variety of *nitidus* and not a distinct species as Forel maintained in Biol. Centr. Amer. Formicidæ, 1899–1900, p. 154.

38. *Camponotus andrei* Forel var. *cholericus* new var.

Worker major.—Length 6.5–7 mm.

Head more elongate than in the worker major of the typical form and with a deeper impression in the middle of the anterior border of the clypeus. Epinotum distinctly lower and more sloping. Hairs covering the body snow white instead of yellowish. In other respects like the typical form of the species.

Worker minor.—Length 4–4.5 mm.

Closely resembling the corresponding phase of the typical *andrei*, but the epinotum distinctly less angular in profile and more sloping, and the hairs on the body more brilliantly white as in the worker major.

Male.—Length 5 mm.

Resembling the minor worker in sculpture and pilosity, but the body entirely black, including the mandibles, antennal funiculi, tarsi and genitalia. Wings whitish hyaline, with dilute yellow veins and brown stigma.

Described from numerous workers and several males taken at Pachuca in the ground under stones in arid territory. The workers

have been compared with a couple of cotypes kindly given me by Prof. Forel.

39. *Camponotus pellarius* new species.

Worker major.—Length 7.5–8 mm.

Superficially resembling *C. chilensis* Spinola in color, sculpture and pilosity. Head, excluding the mandibles, as broad as long, broader behind than in front, with straight sides and very feebly concave posterior border. Mandibles rather small, convex, with 6 subequal teeth. Clypeus flattened, feebly carinate, with straight, entire anterior border. Frontal area distinct, broadly triangular. Frontal carinae sigmoidal, diverging behind. Eyes moderately large and convex. Antennal scapes distinctly flattened at the base, enlarged at their tips, which extend somewhat beyond the posterior corners of the head. Thorax short, rapidly contracted posteriorly, pronotum flattened above, rather broad, with its sides in front distinctly and rather sharply marginate; in profile the outline of the thorax is evenly convex and rounded, the epinotum continuing the curve as this region is uniformly sloping and without distinct base and declivity. Promesonotal suture very distinct; mesoepinotal suture obsolete, but indicated by an impression on the pleurae. Petiole nearly as high as the epinotum, compressed anteroposteriorly, with slightly convex anterior and flat posterior surface and blunt, entire, broadly rounded superior border. Gaster rather large, flattened above. Legs moderately long.

Mandibles shining, sparsely punctate; anterior border of clypeus coarsely punctate, remainder of body, including the antennae and legs opaque, densely punctate.

Hairs rather stout, blunt, snow-white, erect, abundant, moderately long on the body, fore coxae and lower surfaces of the femora, much shorter and more appressed on the remainder of the legs. Anterior clypeal border with a row of golden yellow bristles. Pubescence on the head, thorax and scapes white, sparse and conspicuous, especially on the head; on the dorsal surface of the gaster brilliant golden yellow, and so long and dense as to cover the surface completely.

Whole body black, except the strigils of the fore tibiae, which are deep red.

Worker minor.—Length 5–6.5 mm.

Differing from the major worker only in the smaller size and proportionally smaller and narrower head.

Described from numerous workers taken from a single colony, which was nesting in the crevice of a large rock at San Miguel. This species differs from *chilensis* in having the pronotum marginate on the sides, broader and more flattened above, the clypeus indistinctly instead of strongly carinate and in the pilosity, which is much more abundant, coarser and snow white. The golden pubescence on the gaster is also much more brilliant. That *pellarius* may eventually

turn out to be only a subspecies of *chilensis* seems to be indicated by a series of specimens in my collection taken by the Yale Expedition at Urubamba, Peru (9,500 ft.). These are intermediate between typical specimens of *chilensis* from Valparaiso in the breadth of the pronotum, and are much more pilose, with the pubescence on the gaster of a brilliant orange brown color.

THE NYMPH OF OPHIOGOMPHUS JOHANNUS NEEDHAM.

BY LEWIS B. WOODRUFF,

NEW YORK.

Of the seven recognized species of *Ophiogomphus* occurring in northeastern North America, the nymphs of the three following species are still undescribed: *O. anomalus*, Harvey, *O. mainensis*, Packard, and *O. johannus* Needham. As it has been my good fortune to observe the latter in the process of transformation on more than one occasion, the description of its nymph is now available. This species is by no means rare locally along the stony brooks in the hills of northwestern Connecticut, on the occasional sandy bottoms of which they apparently pass their larval existence. Toward the end of May they crawl out at such points, that is where the margin is sandy, there to await the splitting of the thoracic dorsum. This occurs on the ground at not more than three or four feet from the brook's edge, and often, if not invariably, several hours after sunrise.

The following description of the male nymph of this species is made from very perfect exuviae taken at Litchfield, Conn., May 31, 1909, and preserved with the emerged imagos:

Total length 26 mm.; of abdomen 16 mm.; of hind femur 4.5 mm. Width of head 5 mm.; of abdomen at 5th segment 6.5 mm.

Legs, genæ, sides of antennæ and lateral margins of abdomen sparsely hairy.

Color olivaceous, mottled with yellowish and fuscous; wing cases variegated with pale and dark markings; femora and tibiæ with broad pale bands just before the apices; a quadrate yellowish spot on each lateral dorsum of abdominal segments two to nine inclusive, in each of which are four round

or oval dark orbiculars enclosing yellow centers, except on the ninth, where there are but two of such orbiculars; a pair of small blackish spots in the depressions at the anterior base of the dorsal hooks on segments two to eight inclusive, midway between each of which and the quadrate dorso-lateral spot is another small dark maculation.

Antennæ with second joint slightly smaller than first; third spatulate, flattened, four or five times as long and more than twice as broad as second; fourth rudimentary.

Mentum of labium but little longer than its apical width (3.5×3 mm.), widened beyond basal third with upturned edges as in *O. aspersus*; median lobe rounded, edged with beading of rectangular castaneous denticles, within which is a fringe of long, flat, white scales; lateral lobes narrow, incurved, with a slender movable hook castaneous at tip and bearing dense yellowish setæ on its outer edge; the apex of the lobe is a blunt point without terminal hook, its internal margin with a row of about twelve low, rather blunt, teeth.

Abdomen elongate-oval in outline, widest at fifth segment, not abruptly narrowed on ninth segment; dorsum of tenth segment one-third shorter than ninth; lateral abdominal appendages two-thirds as long as the others, the dorsal and ventral abdominal appendages being equal in length with their tips blackish; lateral spines present on segments seven to nine increasing in length caudad, but on ninth not longer than one-half the length of dorsum of tenth; dorsal hooks on segments two to nine, erect and blunt anteriorly, posteriorly becoming more and more directed caudad, on the ninth almost attaining the form of a spine, and as in *O. aspersus* each surmounting a low transverse ridge; anterior two-thirds of each segment, including the ridge, with thick dark granulations, posterior one-third shining and smooth.

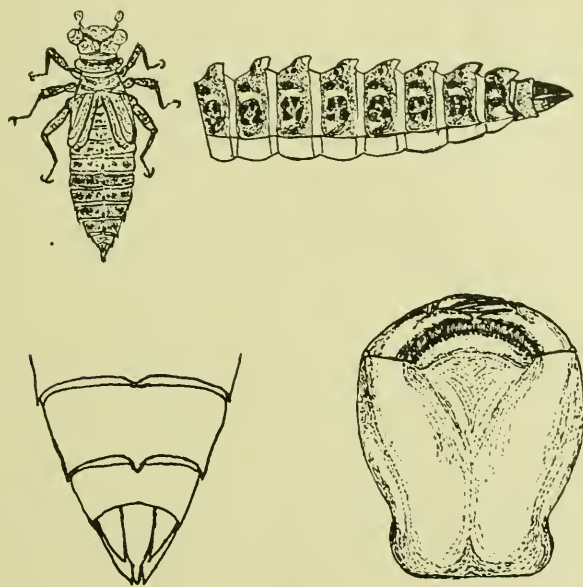
Burrowing hooks on fore and middle tibiæ strong.

The nymph of this species has been compared with alcoholic specimens of *O. aspersus* Morse, and *O. carolus* Needham, and differs from them in the following particulars:

In dorsal aspect it is much more slender in outline than either, the ninth segment of abdomen is not abruptly narrowed, and the lateral spines are decidedly shorter and smaller. In coloration it is darker, and the maculation, though of same general pattern, much more pronounced. From *O. carolus* it differs further in its more conical, less slender, lateral abdominal appendages; the longer dorsum of tenth abdominal segment; much larger and more prominent dorsal hooks; and slightly more slender and darker lateral lobes of labium. Compared with *O. aspersus*, its lateral abdominal appendages are shorter, those of *aspersus* being very slender and fully three-fourths as long as the dorsal appendage; the granulation of abdominal segments is much coarser; dorsal hooks slightly more pronounced; apex of lateral

lobes of labium more slender and less blunt; femora and tibiae stouter; throughout much less hairy; and third joint of antennæ conspicuously different, being much broader and slightly shorter, that of *aspersus* being scarcely wider than first joint. By this character it may easily be distinguished from the latter.

Appended hereto are line drawings of the nymph above described, its abdomen in lateral aspect, its terminal joints and appendages viewed from above, and its labium including mentum.



To Dr. James G. Needham, the describer of the imago of this species, I would make due acknowledgment for his courtesy and generosity in supplying me with the above specimens of *O. aspersus* and *O. carolus* for purposes of comparison.

THE FUNGUS-GROWING ANT ON LONG ISLAND, NEW YORK.

BY WILLIAM T. DAVIS,

NEW BRIGHTON, STATEN ISLAND, N. Y.

In the last edition of the List of New Jersey Insects Prof. Wm. Morton Wheeler has this to say of the ant *Atta septentrionalis* McCook: "Practically confined to the pine regions and is the northern extremity of the range of this 'cutting ant.' It is the only one of the fungus-growing ants whose range extends into the state, and its life cycle is of extreme interest." Among the localities mentioned the most northern are Manasquan and Milltown, where I found colonies of the ant on September 23, 1906, and September 29, 1906, respectively. These localities are south of the Raritan River, but on August 19, 1909, the ant was found to the north of the river at Bonhamtown, where I was collecting insects with Dr. Frank E. Lutz.

In his paper on "The Fungus-Growing Ants of North America," Bulletin Am. Museum of Natural History, Vol. XXIII, 1907, p. 747, Prof. Wheeler comments on the fact that this ant had not been found on Staten Island, N. Y., and adds that "it may yet be found in certain parts of Long Island." This prophecy was fulfilled on June 1, 1913, when I found *Atta septentrionalis* resident on the warm slope of the hill among the scattered trees near the hotel at Wading River. There were a considerable number of nests and they appeared to be quite as strong and well populated as those found in New Jersey. The ants in many instances were engaged in bringing home for use in their fungus gardens the excrement of the then common caterpillars of *Alsophila pometaria*. I also saw some with pieces of the green leaves that the caterpillars had let fall in their promiscuous eating of the foliage of nearly every kind of deciduous tree in the vicinity.

A second visit was made to Wading River in the latter part of June. The ants were not at work above ground in the hot sun on the 24th but later in the day they came from their nests. On the three following days their nests were found on several of the adjoining hills that form part of the range extending along the north shore of

Long Island, but none could be discovered among the pines and oaks on the slopes about Deep Pond out on the level country to the south of Wading River. The ants invariably had their nests in protected places on the hills, where the ground was somewhat barren, such as openings in the woods with sheltering trees and thickets to the north. On these hills grow a few pitch pines and red cedars, but the trees are nearly all deciduous, and the environment does not suggest the sites commonly selected for nest building by *Atta septentrionalis* at Lakehurst and elsewhere in the pine barrens of New Jersey.

The finding of the fungus-growing ant at Wading River, N. Y., extends its known range considerably, and adds one more species to the fauna of the state. While the nearest reported colonies are in New Jersey about one hundred miles to the southwest, it may be safely predicted that some connecting colonies will be found in the future.

JOHN ABBOT, OF GEORGIA.

BY ROBERT PERCY DOW,

BROOKLYN, N. Y.

When John Francillon, silversmith, of the Strand, London, was engaged in making a notable collection of insects, mostly lepidoptera, for twenty years or more from about 1790, and, as was customary among the leading collectors, made a business of selling his duplicates, he offered among other things many unusually fine specimens from the "Province of Georgia, in North America." These, if they were lepidoptera or of other prominently winged orders, were pinned and expanded with a degree of skill which commanded the admiration of the ablest of the Aurelians, by which name the English butterfly collector has been known since a number of them formed the Aurelian Club, with Moses Harris at the Swan Tavern in 1745.¹ Georgia was then far more inaccessible to an Englishman than Java or Cape of Good Hope. Moreover, the prices were very reasonable—

¹ The original Moses Harris is not to be confused with his famous nephew of the same name, the copper-plate engraver, who published the *Aurelian* and other works, drew the plates for Drury's masterpiece, and was secretary of the second Aurelian Club, 1762-66.

six pence per specimen if a round number were taken. If one desired a *Polyphemus*, or *Sphinx* (a particularly well represented group), or any other giant, one must pay accordingly. Besides, there were offered at similar prices inflated larvæ, seldom seen at all and so cleverly done that much was made of the circumstance by Kirby and Spence in their famous "Introduction into Entomology." Again, one could buy from Francillon wonderful water color drawings, not only of mature insects but of their early stages and food plants. With the drawings came manuscript notes of description with English names of insects and plants. The drawings were remarkable for excellence and were absurdly cheap. Francillon was not communicative about their origin. It sufficed most customers to be told that he had a correspondent in Georgia. A few of the elect knew that the name of this man was John Abbot, but none knew his address. It was business for Francillon, for he bought at 3d. and did not propose that his wares should be secured by others from first hands to his own undoing.

Of these drawings several thousand exist in Europe. The British Museum has seventeen stout quarto volumes of them, all bought from Francillon, carrying his name, book stamp, and printed title pages, dated 1792 to 1804. There are volumes of them in the Museums of Oxford, Paris, Zurich and elsewhere. The Boston Society of Natural History has two such volumes, both remarkably fine and one probably the choicest known. Only two have been reproduced and published with credit given to the artist. Sir James Edward Smith of Edinburgh bought from Francillon drawings to make 104 plates and figuring 24 lepidopterous species and bore the expense of publishing the two sumptuous folio volumes which appeared in 1797 and which are now among the classics. Let us be fair about the laurels not on Abbot's brow. It was certainly Smith's privilege to give scientific names to these undescribed species. He bought types, as well as drawings from Francillon. If you or I bought from a New York dealer two dozen butterflies from Africa, raised there by a dealer who sold them for profit, and who was not known to you save by name alone, and you found them to be new species, would you credit his name with yours as the describer? Moreover, Smith never saw or heard directly from Abbot. Abbot knew nothing of the book until long after publication. The credit given to the worker in the field is all that the finest sense

of honor can demand. The title of the book is: "The Natural History of the Rarer Lepidopterous Insects of Georgia, collected from the observations of John Abbot, with the plants on which they feed." The authorship of every species is now universally credited to "Smith and Abbot." No credit whatever is given for the work done by Abbot, utilized in the volumes of Boisduval and Leconte.

Who and what, then, was John Abbot of Georgia? If Francillon was uncommunicative, Abbot was more so, especially concerning the first forty years of his life. One wonders whether there might not have been a sinister reason for it. Emphatically, no! The record of fifty years of Abbot in Georgia shows nothing but a sweet soul. All that is known about the man to the present moment is summarized by Dr. Samuel H. Scudder in *Canadian Entomologist*, Vol. XX, pp. 150-54 and a note by W. F. Kirby, *ibid.*, pp. 230-32. As this volume is in limited circulation, the essential statements follow here. It may be noted that the facts are mainly adduced from his work, the conjectures generally as unsafe as deduction from circumstantial evidence is apt to be.

Oral tradition is all we have had. It is not known where he was born. That he was an Englishman is assumed from his name. His one portrait shows an Irish face, a frail body, and the cotton jean clothing of a Georgia plantation. Scudder says he was about thirty when he went to America in about 1790, and that he was engaged by three or four leading English lepidopterists to collect for their cabinets. The version of the careful Dr. H. Hagen is different. Hagen calls him unequivocally "privatlehrer"—private tutor, the inference being that Abbot went to Georgia in charge of the scion of some wealthy Georgian planter.¹ Scudder says he settled after some travel at Jacksonborough, Scriven Co. The correct spelling is Screven. Scudder asserts that he returned to England about 1810, where he was living in 1840, at an age of "probably above eighty."

Smith says he was given to rearing insects in England from childhood. Abbot himself says, indirectly, that he was fond of drawing plants all his life. That the portrait in the British Museum collection of his drawings is of himself and by himself there is no reasonable

¹ As Dr. Hagen has confused in his *Bibliotheca* two Abbots, one a Scotch clergyman, it is quite possible that the word "privatlehrer" also belongs to the latter.

doubt. This portrait is reproduced by Scudder in his *Butterflies of North America*. His handwriting is well known from his notes which accompanied his drawings, but this signature has never been seen in the memory of living men until recently. It is therefore reproduced below.¹

John Abbot was born in 1750. His education was limited. His grammatical blunders would be unpardonable in any grade above elementary school. His name does not appear in the matriculation lists of any university or great public school in the United Kingdom, without which a private tutorship would be out of the question. He did, however, teach school in Georgia, where at the time educational facilities were almost non-existent, and where the second reader was above the average comprehension. He was not a member of the short-lived Entomological Club of London, 1781-3. He never heard of the Linnean system until after 1805. That he was an Englishman and that he did engage to collect insects for Francillon rests on tradition too widespread to be controvertible. The date, 1790, is a reasonable inference, as the results arriving in England date from 1793. If he did return to England about 1810, it was for a visit only. His later home was in Bulloch Co., just across the Ogechee River from Screven Co., and a day's journey by wagon from Savannah. He never acquired wealth. At best he harvested a few bales of cotton, sold through the same Savannah factor that was employed by the prosperous grower of Sea Island cotton, Dr. Oemler, of Wilmington Island. His old age was simple in the extreme. A couple of dollars a week or less supplied his wants. He dreamed of no laurels to be placed upon his brow, unless some stranger held out this will o' the wisp in his age and infirmity. In all probability he lies in an unmarked grave in Bulloch Co., for in those days tombstones were unusual, vital statistics were not kept there and even land titles were seldom registered.

Who was John Abbot? He was an untutored optimist, with a constitutional smile, who looked forward only to the day's reward, who had talent with the brush, who had the assiduity to rear every insect species he could for over fifty years. May the earth lie lightly upon him. No man has done better.

¹ Some years ago Quaritch, the London bookseller, secured a small quarto volume of the drawings, which contains an undoubtedly authentic signature.

A recent sketch of the career of Dr. Thaddeus W. Harris, of Harvard University, and of his entomological association inspired a fresh search into the archives kept by that eminent pioneer in the attic of his late residence in Cambridge. The first result was a neatly tied package of about 200 letters, dated 1825 to 1835, from entomologists all over the world. Later, many hundred, received by his father, Rev. Thaddeus Mason Harris, author of a *Natural History of the Bible*, were discovered. The two letters reproduced here are by the courtesy of Edward Doubleday Harris, son of Dr. Harris and a member of the New York Entomological Society. They are given *literatim*, for to correct a misspelled word would be a historical crime.

Dr. Oemler is the source of most of our knowledge of Abbot. He bought what he considered the best collection of Abbot drawings in existence, the one now in the Boston Society of Natural History. The Leconte collection remains to be rediscovered.

Rev. T. M. Harris, fatigued with the enormous labor of classifying the correspondence and documents of Geo. Washington for the history of Jared Sparks, and contemplating a new edition of the *Natural History of the Bible*, visited Savannah. Here he learned from Dr. Oemler of Abbot, the remarkable delineator and breeder of insects and went to see him. Hence the correspondence, of which six letters have so far been discovered. The two presented here need no farther annotation. The misspellings of Dr. Oemler are, of course, explained by the unfamiliarity of a German with a few English words. The misspellings of Abbot reveal the man.

Major John Eatton Leconte, father of the Greatest Coleopterist, and himself an entomologist outranked only by Harris and Say, was not disposed to be communicative about his sources of specimens or drawings, for, although he knew Harris well from 1830, he did not mention his Georgia discovery. Leconte came of a Georgia family, and both his father and brother were ardent botanists on their Georgia plantation. No fellow botanist could live in that state without discovery by the Lecontes, who were people of wealth, power, culture and wide acquaintance.

FROM DR. OEMLER TO DR. T. W. HARRIS.

SAVANNAH April 27, 1834.

Dear Sir

This morning I had the pleasure of a conversation with your good father respecting Mr. Abbott. I there learned, that you were under the impression that the old man was "now blind and solely supported by Major Le Conte." I have it in my power to contradict both. Mr. A. used glasses ever since I have known him (1805) and, by means of them, paints the smallest Insects with pretty much correctness, but his hearing faculties are much impaired, the last time I saw him (1825) I had to use the Slate to converse with him. But notwithstanding this misfortune, he was cheerful, and his constitutional smile never left his countenance. He is now, I am told, very corpulent, but still exercises his pursuit of hunting birds and drawing—but engages boys to run after Butterflies. As for to be *supported* (?) by Major Le Conte that is not so, except the petty allowance of Six and a quarter Cents for the drawing of an Insect (be it a flea, or a Bombyx Polyphemus) with a full account of its natural history, may be called such.

You think, Mr. Abbott should be known to the world.—I have always thought so too, so that the Laurals, which are assumed by Smith and Le Conte should be placed on the proper brow. To do this has long been my intention, and for to be enabled to do so, I have prevailed on him to furnish me with some notes. I am satisfied that justice be done him, no matter by whom, and as I consider *you* more capable than myself, I surrender these Notes into your hands. They are, as you will perceive, not concluded yet—I will send you the continuation and any thing else desirable that can be procured by me.

You will be astonished when you hear that a man, so long amusing himself with Natural History, should never have been inclined to pursue it scientifically, he, although now 83 years of age, is still in the simplicity of a School boy. He has been drawing plants since his boyhood and never knew any thing of Linneus' Classification till I demonstrated it to him and created his astonishment. After this, he never committed again the error to paint different numbers of stamens on the same flower.

Perhaps Mr. A. may be dead by this time, and then you would not get the painting your father ordered, and for this reason I send you one of his productions that you may judge of his abilities.

with esteem & regards

Yours

Oemler.

28th.

The above was intended to be sent by your father, who left here for Charleston this morning at 9 o'clock. I was but one minute too late, when I arrived on the wharf, the Steamer was on the way. Hearing that some young ladies are going to morrow to Boston direct, I now forward this by them, but the drawing I have to withhold, not wishing to fold it up.

Professor Harris,

Cambridge.

O.

FROM JOHN ABBOTT TO DR. T. W. HARRIS.

BULLOCH COUNTY, GEORGIA Aug'st 30, 1835

TO DR. THADDEUS WILLIAM HARRIS

Dear Sir

After having entirely given over all hopes of having the pleasure of hearing from You, I was agreeably surprized in receiving on the 23d. last, the favor of yours of the 11th. Feb'y last, a delay I cannot account for

In reply to your request at what price I sell my collections of Insects, my usual price is 6 dollars per hundred large & small rare & common, My charge to Mr. Le Conte for my Drawings & for whom I continue to draw for every Year, the size of which I have figured at the end of this Letter, is .16 for a dollar, they mostly are small Insects, & many are Minutia, & if small & will shew better, something magnified, he must be in possession of .2 or 3000, of them if the size of the paper & the Insect requires it, a larger price in proportion, 25 cents, but never exceeding 50 cents.

I shall complete this Autumn my collections of Insects & set of drawings, & next Spring can contract with You for both, if You think proper, in the mean time, You can send me word, what particular Insects you want, and what Order or Genus You wou'd prefer to have drawn, to begin with, or if only the most rare, or more generally as I meet with them and what size paper, as I suppose you wou'd desire them to be uniform, Mr. Le Conte preferred a single Insect on a paper, as he said he cou'd then class them as he received them.

I have not been able yet to ascertain the difference between the Larva of the Crantor & green Shinx, the color of both is sometimes green, & sometimes claret colored, & both feed on other plants besides Grape, I have only observed that the Crantor is much more rare than the other. The severe cold last Winter, must certainly have killed many in the Woods, as it did all I had in Chrysalis in the house, & I have never yet observed both Shinxes & Larva's so rare as this last Summer, I have therefore had no opportunity to make any further observation, Le Conte insists they are one Species

I have only as yet met with but 2 of the Larva you mention to be found in rotten wood, they both died, without changing, I can't say what kind they produce. I have figured the last I met with from a sketch I have yet by me, it looked in a dark room its whole length like a brilliant diamond It was of a color & size of the drawing

I find it very difficult to know what Insects are rare & what are common, except a very few kinds, & they perhaps are not to be found all over the State. Some Years ago I met with a plenty, (then only) in a small Swamp field, the (*Colias philodice*) since which I have not seen one any where.

Every Year I have observed some few kinds to be plenty, if not common & then not to be met again with, for some years after some few kinds, I reckoned common 3 or 4 years ago, I can't meet with a single one now some plenty on one side of a Creek, & none on the other

Flowers is also local, as well as rare I have met with at times a single specimen, that I have not seen before, nor a single one since but still it might be local, plenty in small spot elsewhere. There is a great variety of flowers in Georgia, but I am no Botanist, yet I am always much pleased, when I meet with any that is new to me.

There is a Gentleman in Savannah who wanted me to make an Herbarium for him to send as a present to a friend a Botanist at the North, indeed I had promised him, but as I was very seriously indisposed in the Spring, I gave it out, & collected Insects only, I understand he is much disappointed, but I don't know if he wants me to do it, next Year as yet—

I shall wait with much anxious expectation, for the Insects you are so kind to promise me, as a few only that are new to me, or some that I have not met of later Years, will be equally acceptable and give me much pleasure.

Please to address your letters to John Abbot Bulloch Co. Georgia, to the care of Mr David Bell. Savannah Hoping to hear from You again soon I remain very respectfully and sincerely

Yours truly John Abbot

If Dr. Harris received either drawings or specimens resulting from this correspondence, they would be now at the rooms of the Boston Society of Natural History. None such are there. Mr. E. D. Harris recalls clearly, that, as a lad, circa 1851-2, he watched his father devote an afternoon to engrossing a neat title page to a volume of drawings supposed at the time to be Abbot's, which Edward Doubleday bought at a second hand book store for seven guineas and sent as a gift. This volume was by a pupil or imitator and is now with the Boston Society of Natural History. It must be inferred that Abbot could not complete the promised herbarium, that physical disability prevented him from making the promised drawings. There is but one later reference known. White, *Instances of Longevity* is Screven Co., 1849, cites John Abbot.

MISCELLANEOUS NOTES.

Another Queen of the "White Ant" Found.—While on a collecting excursion last Fourth of July with Mr. Charles E. Sleight at Lake Hopatcong, N. J., I found a small colony of white ants beneath a small log where they had made some tunnels along the ground beneath the log. Among the individuals was captured a fully developed queen, which was preserved and presented to the local collection of insects, at the American Museum of Natural History.—H. G. BARBER.

MalachiusÆneus Linn.—The occurrence of this common European species in New England was first noted by Leconte in 1856. About 1872 it was taken in numbers by Fred. Blanchard, H. G. Hubbard and friends near Boston. Ten years ago Mr. Chagnon mentioned it as a prized capture near Montreal. The Chris. H. Roberts collection, made in the seventies, had a long series with a "N. H." label. Four years ago it was taken sparingly at Claremont, N. H., by G. P. Englehardt and myself. They are still rare in amateur collections.

Last June I made a special effort to get them. June 8 I took ninety-eight, all males, freshly emerged, and all in the flower of *Ranunculus acris* or crawling up the stem from the ground, in which they pupate. All were taken beside the railroad track which leads from Boston and all in swampy locality. Buttercup patches fifty feet away on dry soil yielded none. The introduced *Sphæridium scarabæoides* was common in the same situation.

A month later Mr. Englehardt took them commonly at Stowe, Vt., a high and dry locality at least ten miles back from the railroad. It may be mentioned that they fly well. Miss Patch reports she has taken them sparingly every year she has been in Maine. I sent specimens to Dr. Felt, who reports records: Jefferson, N. H., July 2, 1901; Albany, July 6, 1906; Ogdensburg, July 10, 1913; Lake Clear, June 1, 1906. Mr. E. A. Schwartz calls them common throughout New England.

The evidence is strongly that the species is not circumpolar, but has come by ship to Boston and Quebec and has been carried by train. Being predaceous as larvæ and pollen eaters as adults, they spread slowly.—R. P. Dow.

Can *Cicindela Unipunctata* Fly?—In Colonel Thos. L. Casey's recent Memoirs on the Coleoptera, IV, he has this to say of *Cicindela unipunctata* Fabr.: "Mr. Leng gives no record of its flying and my material is too scanty to ascertain the development of the wings; they are probably vestigial to some extent." This refers to what Mr. Leng had to say of the species in his Review of the Cicindelidæ (1902), but in this JOURNAL, Vol. XVIII, p. 80, June, 1910, he mentions that we saw *unipunctata* flying on the mountains near Clayton Ga. In an account of our second trip on page 216, Vol. XIX, Dec., 1911, the writer states that *Cicindela unipunctata* ". . . was quite plentifully distributed in the woods and along the wood paths. The individuals that we have seen at Plainfield, Lakewood and Lakehurst in New Jersey, did not fly when disturbed, but at Clayton they flew almost as well as the other native species." It may be added that the wings are just as fully developed in specimens from Plainfield, N. J., as they are in those from Clayton, Ga., being about 13 mm. in length in each case, and why the former do not fly when disturbed remains to be discovered.

At the suggestion of Mr. Charles Schaeffer we have measured the wings in some of our species of about the same size as *Cicindela unipunctata*, and find those of *vulgaris* from Long Island, N. Y., and *generosa* from Lakehurst, N. J., to be each about 15 mm. in length. So Col. Casey is right, the wings in *unipunctata* are "vestigial" to the extent of 2 mm. when compared with some of our other tiger beetles of about the same size, but nevertheless it flies quite well in the mountains of Georgia with its 13 mm. wings.—WM. T. DAVIS.

Water Beetles Taking a Sun-Bath.—On June 21, 1913, Mr. Lewis B. Woodruff and I were on the banks of the Wallkill River near Pine Island, Orange Co., N. Y. A large branch had fallen into the river along the shore, and several of the lesser branches projected almost vertically into the water. On one of these a considerable number of *Dineutes discolor* had climbed and were enjoying a sun-bath, as is their habit. Less than a foot away two other branches entered the water at about right angles, and on these there had congregated a very great number of *Gyrinus dichrous* Lee. Each species was strictly by itself, that is to say though the branches were so close together, there were no *Gyrinus* on the *Dineutes* perch, nor any *Dineutes* among the gatherings of *Gyrinus*.

The sun-bath habit of *Dineutes dicolor* was commented upon in this JOURNAL, Vol. VII, p. 222; September, 1899.—WM. T. DAVIS.

Carabus Caseyi Angell.—In 1913, Colonel Thomas L. Casey, in his Memoirs on the Coleoptera, part IV, page 57, described under the name *Carabus lecontei* a new *Carabus* from Texas. In 1846 Dr. John L. LeConte in "A Descriptive Catalogue of the Geodephagus Coleoptera inhabiting the United States east of the Rocky Mountains," Ann. Lyc. Nat. Hist., Vol. IV, p. 444, described, but without naming, a *Carabus* "found dead at Detroit" and "strongly similar to *C. palustris* of Europe." In 1885 J. B. Gehin, in his "Catalogue synonymique et systematique des Coleopteres de la Tribu des Carabides" gave the name of *Carabus Lecontei* to the form described by Dr. LeConte in 1846 previously noted as Colonel Casey's name. *Carabus lecontei* is, therefore, preoccupied I suggest the name *Carabus caseyi* for the insect described by him. It may be noted in this connection that the specimen found by Dr. LeConte at Detroit and described but not named, was undoubtedly *Carabus macander* Fischer, an insect common to North America and Siberia and which occurs rather abundantly at Detroit. Gehin's name of *Carabus Lecontei* is therefore a synonym of *Carabus macander* Fischer.—G. W. J. ANGELL.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF OCTOBER 21.

A regular meeting of the New York Entomological Society was held October 21, 1913, at 8:15 P. M., in the American Museum of Natural History, President Dr. Raymond C. Osburn in the chair, and 18 members present.

Mr. Barber recorded the death of Dr. O. M. Reuter, of Helsingfors, Finland, one of the foremost writers on Hemiptera.

Mr. Dow spoke of the illness of Dr. Barnes.

The president read letters from Cornell University in reference to a proposed list of the insects of New York State. Discussion followed, in which Dr. Felt, Dr. Lutz and Messrs. Schaeffer, Davis and Barber participated.

On motion by Dr. Southwick, the president appointed Messrs. Davis, Barber and Leng a committee to obtain further details and report at the second meeting in November.

Mr. Davis read a paper on "The Fungus-growing Ant on Long Island," which will be printed in the JOURNAL. He exhibited specimens and commented on this northward extension of its known range.

Mr. Barber spoke of and exhibited "The Queen of the White Ant found at Lake Hopatcong" and donated the specimen to the local collection. His remarks will be printed in the JOURNAL.

Mr. Schaeffer said he had also found this queen at Mosholu and recorded the capture in the minutes about twelve years ago.

Mr. Engelhardt exhibited specimens of various orders mounted by Mr. Marvin H. Mead of Passaic N. J., and under the title "An Original Method of Mounting Insects" explained the process, which consists in placing on the usual vertical pin a small cube of cork through which passes horizontally a finer elbow pin, the point of which enters the under side or caudal extremity of the insect. Mr. Engelhardt pointed out the advantages resulting, the unobstructed view of the insect and its name label, its rotating on desire to see the under side, and the space saved by mounting several corks on one pin; and dwelt particularly on the peculiar conditions under which Mr. Mead, an invalid with limited use of hands and feet, obliged to use a wheel chair, has succeeded in the last ten years in gathering 20,000 to 30,000 specimens, all in extraordinarily fine condition, within a short distance of his home at Passaic; and closed by urging the members to visit Mr. Mead and give him all sympathy and encouragement.

Mr. Dow endorsed Mr. Engelhardt's remarks, and Mr. Mead's father and brother, who were present, added further details as to the process of mounting.

The merit of the process was discussed by Dr. Lutz and Dr. Felt, the latter expressing commendation and by Messrs. Angell, Grossbeck and Schaeffer, the criticisms being that while admirable for Museum exhibition purposes, the process might prove too expensive and slow for ordinary collectors.

Mr. Dow read a paper on "Dr. Harris and His Times" which will be printed in the Brooklyn Bulletin. Mr. Dow's paper was thoroughly appreciated and was followed by the exhibition by Mr. Harris of the original Zimmerman letter quoted by Mr. Dow.

Mr. Harris stated that recently a package of from 200 to 300 letters addressed to Dr. Harris during the years between 1825 and 1836 had been discovered in the attic of his house, evidently unopened since Dr. Harris had wrapped them up about 1841, when the house was built, and unknown to Scudder when he published his correspondence.

Mr. Harris exhibited three of these letters from Haldeman in 1828, F. E. Melsheimer in 1836 and John Abbott in 1835, reading the latter, one of six in his possession, to the Society.

Mr. Dow said letters of John Abbott were of great interest, since very little could now be learned of him, and his letters were rare.

On motion by Mr. Davis and consent of Mr. Harris, it was voted that the Abbott letters be published in the JOURNAL.

MEETING OF NOVEMBER 4.

A regular meeting of the New York Entomological Society was held November 4, 1913 at 8:15 P. M., in the American Museum of Natural History; President Dr. Raymond C. Osburn in the chair, and eleven members present.

Announcement was made of the death of Miss Frances J. Thompson, a member of the Society for many years; and on motion by Mr. Engelhardt, the sympathy of the members was ordered to be expressed in the minutes.

Mr. Dow read a paper on "Early French Coleopterists" which will be printed in the Bulletin of the Brooklyn Entomological Society.

Mr. Leng read a paper "Notes on the Law of Priority" in which it was pointed out that in the case of *Scolytus*, the rules of nomenclature require the use of *Eccoptogaster* in place of *Scolytus*, Eccoptogastrini in place of Scolytini, Eccoptogasteridæ in place of Scolytidæ, although *Scolytus* Geoffroy was described 30 years before *Eccoptogaster* Herbst, though not in binomial form; and suggested that including *Scolytus* among "nomina conservanda" would be welcome to a large number of economic entomologists, as well as in accord with the principle of priority.

Messrs. Wheat, Forbes, Barber, Engelhardt, Dow, Lutz and the president participated in a general discussion of the subject.

Dr. Osburn referred particularly to the description of the Syrphid genus *Callicera* by the late G. H. Verrall, edited after his death by J. E. Collin.

Dr. Forbes exhibited Lepidoptera collected at Lakehurst, N. J., October 19, 1913, especially calling attention to *Leucania juncicola* Guenee as new to the New Jersey list, its habitat being given by Dyar as Alabama and Texas; and *Epiglaea pastillicans tremula* Harvey as being common at Lakehurst, though previously considered as rare except in Texas.

MEETING OF NOVEMBER 18.

A regular meeting of the New York Entomological Society was held November 18, 1913, at 8:15 P. M., in the American Museum of Natural History, President Dr. Raymond C. Osburn in the chair with nineteen members and three visitors present.

The librarian reported the receipt from the Washington Academy of Sciences of some reprints of papers by Col. Thomas L. Casey, for distribution to our members. He also exhibited the album prepared by Mr. Wunder, from covers and sheets presented by Mr. Davis, for photographs of localities and members in the field, and commented on the pains Mr. Wunder had taken to put these photographs into permanent and attractive form.

On motion, a vote of thanks to Messrs. Wunder and Davis was passed.

The committee on the New York state list reported approval and recommended the election of a delegate to the editorial board thereof.

After discussion by Messrs. Schaeffer, Davis, Engelhardt, Dr. Forbes and Dr. Lutz, the report was approved and Mr. H. G. Barber was elected the delegate of the Society.

Mr. Davis proposed for active membership Mr. Alan Sloan Nicolay, of No. 416-A Grand Ave., Brooklyn.

On motion the by-laws were suspended and Mr. Nicolay was immediately elected an active member of the Society.

Mr. Harris read a paper on "Recently Noted Forms of *Omus*" illustrated by a selection of specimens from his collection, ten of which represented recently discovered varieties. Mr. Harris referred to the recent activity in the field of Mr. Nunenmacher and to the descriptions of Dr. Walther Horn by which several new forms had been made known, so that the total list of species, subspecies and varieties shown on the blackboard by Mr. Harris was as follows:

OMUS Eschscholtz.

1. *dejeani* Reiche.
2. *submetallicus* G. H. Horn.
3. *californicus* Eschscholtz.

Synonyms; *xanti* Lec., and *hornianus* W. Horn.
variety *sculptilis* Casey.

Subspecies inhabiting northern California and Oregon:

- 3a. *audouini* Reiche (extending north to Vancouver).
- 3b. *ambiguus* Schaupp with *humeroplanatus*, and three more unnamed forms.¹
- 3c. *mimus* Casey with three unnamed forms, with one of which *borealis* Casey may be identical.
- 3d. *vandykei* W. Horn.

Subspecies inhabiting Sierra Nevada:

- 3e. *punctifrons* Casey with *fraterculus* Casey (= *rugipennis* Van Dyke MSS.), *confluens* Casey and *degener* Casey as allied forms.
- 3f. *edwardsi* Crotch with *montanus*, *lobatus*, *lucidicollis* and *brunnescens* Casey as closely allied forms.

Subspecies of the more southern mountains.

- 3g. *sequoiarum* Crotch with *lugubris* Casey as closely allied form.
- 3h. *horni* Leconte with *collaris* Casey and *compositus* Casey as allied forms.
- 3i. *intermedius* Leng with *procerus*, *parvicollis*, *cribripennis* and *blaisdelli* Casey as closely allied forms.

- 3j. *laevis* Leconte with *tularensis* and *gracilior* Casey as allied forms.

Subspecies of the coast range, Monterey County, &c.

- 3k. *lecontei* G. H. Horn with *elongatus*, *duani*, *regularis* and *maritimus* Casey closely allied.
- 3l. *fuchsi* W. Horn.

Mr. Harris commented on the extremely minute differences between some of the forms inhabiting different regions on the Pacific slope, but said these differences were apparently constant; they consist as far as indicated by descriptions in modifications of the form of the thorax and elytra and of the

¹ Since described by Dr. W. Horn as *nunenmacheri*, *angusto cylindricus* and *intermedio pronotalis*.

sculpture of those parts, and without typical specimens for comparison it would undoubtedly be difficult to separate some of the forms by description alone, and he hoped that Dr. Horn would ultimately find more positive characters for their separation, perhaps in the setæ. Mr. Harris expressed his gratification at having been able to secure from Mr. Nunenmacher cotypes of the forms recently described from his captures, so that he was able to exhibit a collection nearly complete of all the described forms.

The paper was discussed by Mr. Schaeffer, who commented on the value of the setæ as shown by the work of Geo. H. Horn and others in Carabidæ and especially lately by Dr. Roeschke in his monograph of the Cydrini; by Mr. Leng, who said that ten years ago the specific names in *Omus* represented mainly the races inhabiting the different mountain ranges, while now the varietal names introduced represented rather the races inhabiting the different valleys in each range and were liable under continued exploration to be much further multiplied as new valleys were reached; and by the president, whose questions brought out that the lower the mountains the greater the range of the race inhabiting them, the lofty ridges of the Sierra Nevada apparently acting as barriers to isolate the individuals inhabiting the intervening valleys.

Mr. Woodruff read a paper on "Some Dragonflies of a Connecticut Brook" which will be printed in the JOURNAL.

Mr. Hallinan in discussing this paper described his experiments in cutting and restraining the fore and hind wings alternately, and in estimating the speed of dragon flies. The paper was also discussed by Messrs. Schaeffer, Davis and the president.

The president being obliged to retire on account of another engagement, Mr. Davis, at his request, presided for the remainder of the evening.

Mr. Henry Bird read a paper on "A New Species of Noctuid Moth Subsisting in New York City," and exhibited the moth *Papaipema lysimachia*, its larvæ and pupæ, stating that it bred commonly in the stems of the whorled or four-leaved loosestrife; it has heretofore been confused with a species very similar in the adult stage boring in columbine.

The paper was discussed by Dr. Forbes and Messrs. Davis, Grossbeck, Engelhardt and Schaeffer, especially in regard to the different results attained by change of food, some species being stable against, others being affected by change of food; the larvæ being sometimes affected, but the imagos not. In one case a batch of eggs was divided and two supposedly different species were reared by difference in feeding. Mr. Engelhardt mentioned the similar case of *Sesia pictipes*.

Mr. Schaeffer exhibited his collection of the genera *Temnochila* and *Tenebroides* and spoke in detail of the characters by which the species would be separated in his forthcoming paper. He mentioned the difficulty he had in recognizing the true *virescens* and the pleasure he experienced in finding *acuta* and *virescens* correctly separated in the small collection of Coleoptera in the Long Island Historical Society.

Mr. Schaeffer also spoke of the genus *Scarites*, saying that *S. subter-*

raneus, the common species about New York, extends from the Atlantic to the Pacific and even into Mexico, with slight varieties in which the elytra are smoother, known as *texanus* and *californicus*. *S. substriatus* is larger, differs in the outer joints of the antennæ more elongate and in the possession of two or three denticles in the emargination behind the second tooth of the front tibia where *subterraneus* has generally only one. *Substriatus* has also a smooth variety in Texas called *lissopterus*. A third species, *alternatus*, is reported with some doubt from Chokoluskee, Fla. It is known from Cuba and has a larger head, elytra different in form and the striae at the sides of the elytra deeply impressed.

Mr. Schaeffer's remarks were discussed by Messrs. Davis and Leng.

The secretary read a communication from Mr. Joutel on the queens of white ants he had found which will be printed in the JOURNAL.

Mr. Woodruff mentioned that he had received a quantity of white ants from timber in a house at Washington Square, among which were two queens, but not developed as those described by Mr. Joutel.

Discussion by Dr. Forbes and Messrs. Davis and Schaeffer followed.

The secretary read by title two communications from Mr. Dow on *Malachius aeneus* and *Alaus canadensis* which will be printed in the JOURNAL.

MEETING OF DECEMBER 2.

A regular meeting of the New York Entomological Society was held December 2, 1913, at 8:15 P. M., in the American Museum of Natural History, President Dr. Raymond C. Osburn in the chair, with twenty members and several visitors, including Mr. Roland M. Harper, present.

Dr. Lutz presented on behalf of Mr. Grossbeck additions to the Society's collection of photographs.

Messrs. Engelhardt and de Vyver also presented photographs.

Prof. J. Chester Bradley of Cornell University, after showing illustrations of the localities on the Canoochee River where he had taken *Cicindela blanda* at or near the type locality cited by Dr. Leconte for its synonym *tarsalis* Lec.; and of clusters of *Hippodamia* as large as one's fist on bushes at summit of Rabun Bald, Ga., read a paper on "Collecting Insects in the Okefenoke Swamp" illustrated by lantern slides in part loaned by Mr. F. H. Harper, of which many were colored by Mrs. Yantis. The paper and the maps thrown on the screen covered the historical character of this swamp, located in the south-east corner of Georgia and 300 miles in circumference; the character of the vegetation in its different portions, such as the "islands," slightly elevated parts, on one of which, Billy's Island, the expedition camped, where long leaf pines, 80 feet high, are abundant, and where two families named Lee reside permanently; the intervening swamp darkened by the dense vegetation and inhabited by alligators, snakes and great hairy spiders, through which passage for man or boat must be cut out of the trees, bushes and interlacing vines with machetes; the "hummocks" which rise out of the swamp too little to support pines; the "prairies," open places with dense sphagnum and herbaceous vege-

tation concealing the water through which the trails are at least knee deep in soaking wet muck; the "cypress heads," clusters of bushes, etc., gathered about cypress roots, causing the appearance of slight elevations in the prairies; the wetter "bays" where cypress and black gums grow; and the still wetter portions of the swamp where the depth of the water prevents the vegetation reaching the surface and forms runaways and long narrow lakes, once useful to the Creeks and Seminoles as they are now to the few hunters and natives who know the trails through the swamp. Each of these features was copiously illustrated and the botanical characteristics of each, based on data supplied by Messrs. Stewartson Brown and Roland M. Harper, were covered in some detail.

The different expeditions that have penetrated the swamp were mentioned and especially the various journeys by Mr. Harper, starting from Waycross, where the tramways of the Hebard Cypress Co. are of assistance. Professor Bradley said he had entered by that route, also by way of Folkston, but preferred the route by way of Fargo, on account of the rough wagon road, which though deep in water in many places, permitted of taking supplies into the heart of the swamp.

Dealing with the entomological features, the speaker referred especially to the Tabanids, abundant everywhere. *Tabanus mexicanus*, locally called the green cowfly, appeared at daybreak in great numbers, swarming about the tents like a swarm of bees and again at night when the cows came home. *Diachlora*, locally known as the yellow fly, was very abundant and very annoying in the swamp. Dragon flies were also conspicuous by their great numbers and were occasionally so tame as to permit of lifting them gently by hand. *Libellula vibrans*, *axillena* and *incesta* were the commonest species about the tent ropes and buildings; *auripennis* mixed with them, more or less commonly. *Epiaschna heros* in countless numbers sped unceasingly back and forth in search of gnats and other prey. *Pachydiplax longipennis*, *Celithemis ornata*, *Mesothemis simplicicollis*, *Heterina tricolor* and *titia*, *Erythemis minuscula*, *Anomalagrion hastatum* and *Agrion apicale* were all common on Billy's Island or along Billy's Lake, and *Agrion maculatum* in the deeper parts of the swamp, but *Celithemis fasciata*, *C. eponina*, *Erythemis berenice*, *Tramea onusta* were rarely seen, far less common than outside the swamp.

Professor Bradley laid stress upon the great numbers in which certain species occurred and the equally conspicuous absence of other species common in the surrounding region of southeastern Georgia, outside the swamp, including naturally those which failed to find food plants in the swamp and those which generally follow human habitations.

In Hymenoptera there were five species of *Bombus*, several *Polistes*, but apparently no *Vespa*. In Lepidoptera *Caliphilus canius* was found in the piney woods, and *Papilio glaucus turnus* and *P. palamedes* clustered in such numbers about a damp place as to permit once of 50 individuals being covered by a single stroke of the net. These proved later to be all males but one. *P. troilus* was scarce and other *Papilios* like *ajax*, *cresphontes* and *philenor*

were entirely absent. The Orthoptera were scarce until September when many *Belocephalus* and an *Atlanticus*, probably undescribed, were found in considerable numbers at night by using a flashlight. The katydids were apparently entirely absent.

The illustrations showed many of these insects in color and included also many items of human interest, homemade chairs covered with alligator hide, bee hives made of hollow cypress logs, pelts of the coons, wild cat, bear, and deer that are common in the swamp, methods of striking fish at night, protecting sleeping tents from mosquitos; and showed well the picturesque features of the swamp, the trees draped with Spanish moss, the tupelos rising straight from the coffee-colored water, bearing clumps of mistletoe with the herons resting on their branches, and the sunset colors shining over all.

Professor Bradley's remarks also brought out some of the less agreeable features of the swamp, for he referred more than once to the swarms of mosquitos, the great hairy spiders, the moccasins and rattlesnakes, the wading through trails so moist that "the more you keep out of the trail the better the walking," the swimming in 'gator holes in search of aquatic hymenoptera; and were all followed with close attention.

On account of the late hour, Mr. Wintersteiner's paper was postponed and the Society adjourned for informal discussion of Professor Bradley's topic.

MEETING OF DECEMBER 16.

A regular meeting of the New York Entomological Society was held December 16, 1913, at 8:15 P. M., in the American Museum of Natural History, President Dr. Raymond C. Osburn in the chair, with eighteen members present, and several visitors, including Mr. Buchholtz of the Newark Society.

At the request of the curator, Mr. Leng announced that the Coleopterists would resume Saturday afternoon meetings on December 20, the subject being the Barini.

Mr. Davis, as delegate to New York Academy of Sciences, stated that the appropriation for Biological Survey of Porto Rico having been obtained, an activity in which our members would be interested might soon be expected.

The president and Dr. Lutz referred to the general character of the work anticipated.

Mr. Dow read a paper entitled "John Abbot of Georgia" in which he presented a lifelike picture of this early entomologist who collected and figured many of the insects described by Boisduval, the elder Leconte and others, and carried on the researches recorded in the work of Abbot & Smith, continuing at the age of 85 years, a correspondence with Dr. Thaddeus W. Harris, from which some of Mr. Dow's data, heretofore unknown, were obtained. This paper will be printed in full in the JOURNAL.

Mr. Bird under the title "A Thirteen-year Environmental Search" recounted the difficulty of locating the food plant of the moth *Papaipema speciosissima*, finally found to be the large rootstock of three different species of fern growing at the borders of salt meadows near Newark, where Mr. Buch-

holtz had assisted in the search. Mr. Bird's remarks were, as he expressed it, illustrated by the proceeds, a number of the moths, the inflated caterpillars, the pupæ and the rootstock of the fern showing the borings, as well as two of the parasites.

In reply to questions by Mr. Engelhardt, Mr. Bird said that only old established roots were infested and that the larvæ leave them to pupate.

Dr. Lutz read a paper on "Humidity and Experimental Work" in which he pointed out the preponderance of data on temperature at the expense of other factors and the difficulty of isolating the consequences of temperature and humidity; leading to the possibility that many results ascribed to temperature are really due to concurrent differences in humidity.

Mr. Engelhardt showed photographs of a nest of *Vespa crabro* made by Dr. Bigelow at Sound Beach, Conn., and found by three boys, also a photograph of the boy who removed the nest after the operation.

MEETING OF JANUARY 6.

The annual meeting of the New York Entomological Society was held January 6, 1914, at 8:15 P. M., in the American Museum of Natural History, President Dr. Raymond C. Osburn in the chair, with 13 members and two visitors, Mr. J. H. Emerton and Mr. W. T. Bather, present.

The secretary reported 16 meetings held during the year, with an average attendance of nineteen members, the largest attendance having been twenty-eight members, and the total number in attendance at one or more meetings being fifty-one, of whom twenty-nine have attended all meetings more or less regularly.

Dr. Lutz, in resigning his office as curator, extended his thanks to all the members for the assistance they had given him in developing the local collection.

Mr. Davis, as delegate to the council of the New York Academy of Sciences, reported that Mr. Louis H. Joutel had repaid the grant of \$150 made to him some years ago from the Herrmann Fund to further his studies of white ants, having been prevented by his long-continued illness from completing them. At the request of the president, Mr. Davis added that the council had received the repayment unwillingly, and stood ready to defray the expense of stenographic or other assistance necessary to facilitate the recording of the data accumulated by Mr. Joutel, should his health permit of his dictating the results of the studies made previous to his illness. ✓

Mr. Schaeffer spoke of the value of the information gathered by Mr. Joutel and the desirability of recording it if possible.

The nominating committee reported the following list of officers and committees for 1914:

President—Raymond C. Osburn.

Vice-President—Harry G. Barber.

Secretary—C. W. Leng.

Treasurer—William T. Davis.

Librarian—John A. Grossbeck.

Curator—Andrew J. Mutchler.

Executive Committee—C. W. Leng, E. G. Love, Charles E. Sleight, Geo. P. Engelhardt, Robert P. Dow.

Publication Committee—Charles Schaeffer, Frank E. Lutz, W. P. Comstock, Lewis B. Woodruff.

Auditing Committee—Christian F. Groth, G. W. J. Angell, C. H. Roberts.

Field Committee—John D. Sherman, Ernest Shoemaker.

Delegates to the Council of the New York Academy of Sciences—William T. Davis.

On motion by Mr. Angell, the nominations were declared closed, and the secretary was instructed to cast an affirmative ballot.

A vote of thanks to Dr. F. E. Lutz, the retiring curator, was moved by Mr. Leng, and at the suggestion of the president, unanimously adopted by a standing vote.

Mr. S. Bevin, of 488 Myrtle Ave., Flushing, L. I., was proposed for active membership by Mr. Davis. On motion the by-laws were suspended and Mr. Bevin immediately elected.

Dr. Osburn presented some general remarks as an annual presidential address, in which he pointed out the social advantage of our meetings, but dwelt particularly upon the different phases of entomology in which our members are interested, and the consequent advantage to each member of having different views of the subject brought to his notice. Speaking of the history of the Society, Dr. Osburn said: "It was founded by a mixed class of students and collectors of insects, though the interest was not so general in the earlier years as it is at present. But that can partly be explained by the fact that whole branches of zoological science have been added since this Society was organized, and others were at that time in their beginning. Think for a moment of the growth of economic entomology during these years, and that the doctrine of evolution has become firmly established in the popular mind; consider that the transmission of diseases by insects has been proved since this Society was organized, thereby opening up whole fields of entomological research; that the subject of genetics has been properly based during the same time with some of the very best work in transmission segregation, analysis and fixing of hereditary characteristics done upon insect material; that much of the hereditary basis of transmission of characters in the germ cells has been worked out on this same group within the past dozen years, and that the study of ecological relations has had almost its entire growth as a science in the same time, and one can easily understand why the New York Entomological Society of today differs from that of 1892 in its attitude toward entomology and general science."

Dr. Osburn closed his remarks by an expression of his appreciation of the spirit of mutual helpfulness and generosity evident at our meetings, and his hope that at the end of another year we may feel that we have advanced personally in our subject and that our subject has been advanced to some extent because of our labors.

Mr. Wintersteiner exhibited his collection of the American and European species of *Cercyon* and read a paper entitled "Preliminary Remarks on *Cercyon*" in which he pointed out that structural characters separate three groups of different habits, viz.: dwellers by the seashore, under manure and under decomposing vegetation, and that while some species, at least, of the first two groups, possibly carried by ocean currents or by commerce, seemed to be common to the old and the new world; the species of the third group, living under decomposing vegetation, are not, as a rule, identical in Europe and America. The circumpolar distribution of the genus, accepted as a fact by Dr. Horn, becomes therefore very doubtful.

This paper was discussed by the president and Mr. Schaeffer, and will be printed in full in the JOURNAL.

Mr. R. P. Dow read a paper on "The Greatest Coleopterist" in which the early life of Dr. Leconte, his relations with his father, and his accomplishments during thirty-nine years of active entomological work, were remarkably portrayed. This paper will be printed in this journal.

Mr. Leng read a paper "Notes on *Scaphinotus*" which will also be printed in the JOURNAL, exhibiting his collection and a drawing of *S. shoemakeri* n. subsp. made by Mr. Ernest Shoemaker, who had found the specimens near Washington, D. C.

Mr. Angell exhibited his long series of this and other species of *Scaphinotus*.

Mr. Davis read a paper on "The Flight of *Cicindela unipunctata*" illustrated by specimens with the wings expanded, and another on "Swarming of *Dineutes discolor* and *Gyrinus dichrous*," which species he found did not mingle. These will also be printed in the JOURNAL.

Mr. J. H. Emerton, present as a visitor, on request, spoke of the spider *Epeira labyrinthica*, and an allied species, differing in form of body and markings, in its web and other characteristics, and which has so far been found only in the mountains of Colorado, and in a swamp in Maine, where, Dr. Fernald states, certain Colorado mountain plants are also found.

Mr. Angell called attention to the name *Carabus lecontei* Casey as being preoccupied by *C. lecontei* Gehin proposed for a form of *C. Mareander* from Lake Superior, mentioned but not named by Leconte.

MEETING OF JANUARY 20.

A regular meeting of the New York Entomological Society was held January 20, 1914, at 8:15 P. M., in the American Museum of Natural History, President Dr. Raymond C. Osburn in the chair, and twenty members present.

The curator reported the local collection of spiders as now aggregating 196 species, and read a letter from Mr. J. H. Emerton, mentioning the ease with which collectors of Coleoptera could add to this number by simply putting spiders encountered into alcohol.

He also mentioned gifts to the local collection of *Scaphinotus shoemakeri* from Mr. Angell, and of *Scydmanida*, *Pselaphida* and *Aleocharina* from Mr. Leng.

Mr. Davis spoke of "Some Methods of Caring for Insects" stating that while in Florida he found some methodical treatment of the 5,000 insects caught very necessary. He particularly recommended cigar boxes, divided through the middle by an extra board to prevent the cover breaking, and packed with alternate layers of paper and cotton. The paper should be about as heavy as newspaper, the box should be tightly packed to obviate shifting of contents, and naphthaline should be freely used to deter ants and prevent mould. Such boxes, Mr. Davis said, will hold a large number of insects, the papers may be used to record data of any sort; and the boxes, when filled, may be mailed home to await the collector's return. In the field this packing takes less time than paper rolls, and avoids crushing the bodies and other distortions. He also recommended small bottles separated by corrugated paper for alcoholic specimens, the alcohol to be poured off before shipment, so the specimens would be simply moist, the bottles to be filled to prevent contents moving. Lepidoptera he found were best pinned in the field and grasshoppers preferably packed dry in cigarette boxes. Dragonflies were best preserved in 95% alcohol, by which treatment the natural colors were retained, but katydids would change color in alcohol and travel best in a weak solution of formaldehyde, 19 parts of water to 1 part of commercial formaldehyde. Especial care should be exercised to keep heavy and light-bodied insects apart, as for instance dragonflies and grasshoppers.

Mr. Davis also showed some appliances to facilitate mounting, especially a board devised by Mr. Sleight for mounting small beetles on points. This was as thick as the distance from pinhead to the paper triangle and provided with a row of holes down each side. The beetles were laid alongside the holes, on their backs, and the pins, with the paper triangle attached and tipped with glue, were dropped into the holes. Mr. Wheat suggested that a groove parallel with the row of holes would aid in keeping the beetle straight on the triangle and avoid some becoming mounted sidewise.

Mr. Davis also showed his method of pinning insects on thick sheets of peat to prevent the legs drooping in drying, with subsequent liability of breakage, and mentioned that Col. Wirt Robinson used a pasteboard box for the same purpose. Other methods were shown for making mounts for Lepidoptera out of cigar boxes, cotton and glass, for stretching Lepidoptera on flat boards, and for keeping glass vials in boxes of the usual collection size. Also a method of accommodating rapid increases in collections by putting one or two specimens of each species in the first box and adding boxes for additional material. In closing, Mr. Davis spoke of softening methods, recommending a softening jar or box as preferable to hot water, which he found liable to change colors. This led to some discussion, Mr. Angell stating that he had always used cold or tepid water, with a satisfactory result after 15 or 20 minutes' immersion, with a final dip in alcohol to hasten drying. Mr. Schaeffer objected to the resulting damage to pubescent insects.

In discussing Mr. Davis's remarks, Dr. Osburn pointed out that alcohol was unmailable and particularly in foreign countries was liable to lead to

postal difficulties; Dr. Lutz pointed out that where the green coloring is due to chlorophyll, alcohol cannot be used, and mentioned that cotton can be advantageously used to fill up bottles.

Mr. Nicolay read a paper on "The *Mordellidæ* of New York State" in which he reviewed individually the fifty-one species known to occur in the state and pointed out the preponderance of species in the more mountainous regions.

His paper was discussed by Messrs. Dow, Schaeffer and Leng and will be later printed in full.

Dr. Lutz read a paper "Biological Notes on *Drosophila*" in which, after stating that about 70 variations from normal type have been observed, he pointed out the results that have been obtained in two of them, viz.: the wing variation and the eye-color variation. In captivity it has been possible to fix these variations in a comparatively small number of generations, so that they breed practically true, and become in a sense, new species: but if exposed to competition with normal forms in captivity, as they presumably would be in a wild state, they quickly return to normal form. In *Drosophila*, these variations are disadvantageous to the species, that is the shortened wings artificially produced detract from flying power and the pale eyes from seeing power; and therefore the females choose a normal mate in preference to an abnormal one, resulting in the abnormal features being quickly extinguished in the offspring. The observed variations have all been natural mutants originally, and as liable to occur in a wild state as in captivity; but not liable to be perpetuated in a wild state. Should the variation, however, be advantageous to the species, as appeared to be the case in some of Dr. Tower's experiments with *Leptinotarsa*, the preference of the female might be reserved and the variation become perpetuated in the offspring.

Dr. Lutz pointed out the immense number of new species capable of resulting from the possible combinations of 70 different variations, any one of which, though not likely to be perpetuated, might easily arise in nature and even survive for a few generations; and if caught, pinned and subjected to the usual taxonomic treatment, almost certain to become a type; and in view of the facts now made plain by experimental work, he said one may well pause to entertain the suspicion that many of the obscure species recently described are perhaps merely examples of such variations occurring in nature.

Dr. Lutz exhibited tables derived from 4,000 experiments, the large number eliminating the chance of error, covering the results stated and exemplifying also the relative duration of larval, pupal and mature life under various conditions.

His remarks were discussed by Dr. Osburn and Messrs. Davis, Schaeffer, Angell and Leng, the latter recalling that the phrase "taxonomic unit" is now used by some authors to indicate an aggregate of individuals of doubtful standing.

Mr. Comstock exhibited two boxes of *Lycanida* and referring to the light thrown upon certain puzzling species by the figures recently published of

Boisduval types, said that *Thecla putnami* and *itys* seemed to be geographic races of *Thecla sylvinus*, since in the large series he showed, the variation could be traced and each, moreover, was confined to its own special territory.

Mr. Wheat brought up for discussion the use more than once in the same genus of such names as *rufa*, *minor*, *major*, etc., to indicate parallel variations in different species. Dr. Osburn, Dr. Lutz, Messrs Schaeffer and Comstock spoke on this subject, the consensus of opinion being that though used by some authors, the practice was contrary to the rules of nomenclature, and liable to confusion.

Mr. Angell referring to the alleged synonymy of *Scaphinotus unicolor* and *heros*, exhibited a *Scaphinotus* collected by H. P. Loding, at Mt. Vernon, on the Mobile River, in southern Alabama, with typical *heros* and *shoemakeri*, and said that the Alabama specimen while nearer to *S. elevatus* than *heros*, complied perfectly with the figure and description of *unicolor*, besides coming from the probable locality for that species. In his opinion therefore, this specimen represented *S. unicolor* and *heros* could not be a synonym.

Mr. Angell also exhibited a specimen of *Carabus cancellatus*, derived from the Jülich collection, to which it was presented by Mr. Wilt; this and other specimens of *C. cancellatus* were taken from a bottle containing only American insects and collected at Wilmington, N. C.

Mr. Angell also exhibited a specimen from the Schaupp collection, labelled N. Y., resembling *Carabus tadatus*, but much more elongate.

Mr. Davis, expressing admiration of Mr. Comstock's boxes, led the latter to give some details of their manufacture from binders' board for top and bottom, lock corner frames and homemade cork.

The latter, Mr. Comstock said, was made by spreading the cork in which grapes are packed, one inch deep, in a suitable frame, cooking it 20 minutes and compressing with an ordinary letter press to $\frac{1}{4}$ inch thick. The action of the heat caused the natural sap, in the absence of air, to cement the mass into a solid sheet, just as the linings for ice boxes are made on a larger scale.

Mr. Leng exhibited a dark specimen of *Coccinella* received from Dr. W. E. Britton and said it was possibly a melanic form of *C. monticola*.

Dr. Osburn recorded the emergence of a cabbage butterfly in January, in an apartment house.

Mr. Davis mentioned the excellent collecting in the reptile house in the Zoological garden, where under the straw, provided for the great Galapagos turtles, he had found four species of cockroaches. The weight of the turtles was somewhat of a disadvantage; but with Mr. Snyder's help he had removed the turtles from his garments, as well as the roaches from their steam-heated abode.

THE NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except June, July, August and September) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

Annual dues for Active Members, \$3.00.

Members of the Society will please remit their annual dues, payable in January, to the treasurer.

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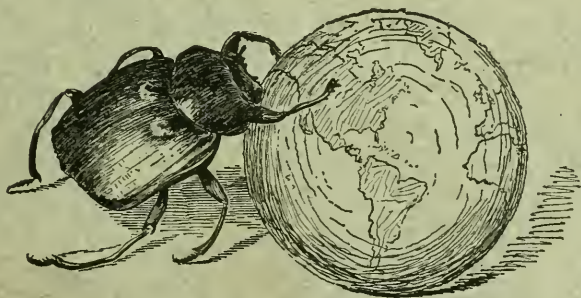
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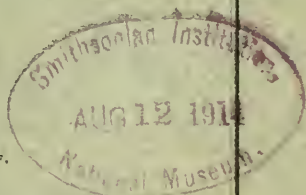


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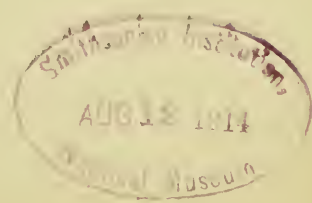
UNITED STATES AND MEXICAN RECORDS OF
SPECIES OF THE GENUS DORU (DERMAP-
TERA; FORFICULIDÆ).

BY JAMES A. G. REHN AND MORGAN HEBARD.

PHILADELPHIA, PA.

The variability found in the species belonging to the present genus has caused numerous synonyms to be erected during the period when very few specimens were to be found in collections; this difficulty was augmented by the apparent fact that practically no actual comparisons were made. Recent efforts to retain some of these synonymic names in varietal rank have only served to augment the confusion. Study of the large series of specimens before us, and of Scudder's types, at once shows that three distinct species of the genus exist within our boundaries; one of these is widely distributed as far south as the Argentine Republic, in South America, the other two have never been found outside the United States. These species may be separated by the following key:

- A. Entire insect compact. Spine of pygidium of male not nearly as long as distal abdominal segment.
- B. Wings exposed. Spine of pygidium of male acicular, not one half as long as distal abdominal segment. Forceps of male curving scarcely or very slightly upward in distal third.....*lineare* (Eschscholtz).
- BB. Wings not visible. Spine of pygidium of male acicular, one half as long as distal abdominal segment. Forceps of male curving more decidedly upward in distal third.....*aculeatum* (Scudder).
- AA. Entire insect more attenuate. Spine of pygidium of male as long as, or



longer than, distal abdominal segment. (Wings not visible. Spine of pygidium of male strongly acicular. Forceps of male curving downward in proximal third, thence curving upward in a broad sweep to apex.).....*davisi* new species.

***Doru lineare* (Eschscholtz).**

1822. *Forficula linearis* Eschscholtz, Entomogr., p. 81. (Santa Catharina, Brazil.)

1839. *Forficula suturalis* Serville, Hist. Nat. des Ins. Orth., p. 40. (Porto Allegro, Brazil.)

1862. *Forficula taniata* Dohrn, Stett. Ent. Zeit., XXIII, p. 230. (Oaxaca, Mirador, Mexico.)

1865. *F[orficula] californica* Dohrn, Stett. Ent. Zeit., XXVI, p. 85. (California.)

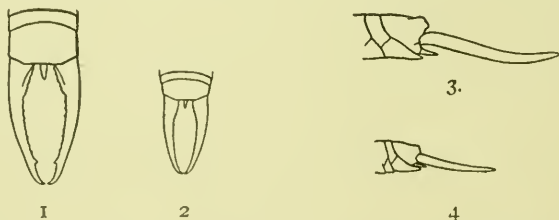
1876. *Forficula luteipes* Scudder, Proc. Bost. Soc. Nat. Hist., XVIII, p. 255. (Brazil.)

1876. *Forficula exilis* Scudder, Proc. Bost. Soc. Nat., XVIII, p. 262. (Texas.)

1891. *Sphingolabis meridionalis* Kirby (in part), Journ. Linn. Soc. London, Zool., XXIII, p. 529. (Theresopolis, Brazil.)

Type: Female; Santa Catharina, Brazil.

Scudder's descriptions in 1876 of the male as *Forficula exilis*, and of the female as *Forficula luteipes*, are as full as any published for the present species. Considerable variation is shown in size and color and also in the shape of the male forceps. Material from Texas, Mexico, Cuba, Nicaragua and Costa Rica includes the largest specimens and averages considerably larger than material from Arizona,



Dorsal outline of male forceps of *Doru lineare* (1; Brownsville, Texas) and (2; Baboquivari Mount, Ariz.)

Lateral outline of male forceps of *Doru lineare* (3; Brownsville, Texas) and (4; Baboquivari Mount, Ariz.)

California, Brazil and Argentina. In the series are a number of specimens which have the head and pronotum shining burnt sienna in general coloration instead of the usual shining blackish brown. The male forceps range from a rather heavy type, rather sharply bent at

the end of the proximal third and bearing a pronounced inner tooth at the beginning of the distal third, to a delicate, gently and almost evenly curved type in which the inner tooth at the base of the distal third is often wholly absent. It is not surprising that Dohrn considered a single specimen of this latter type a distinct species and named it *californica*, but in several of the series from a single locality the extremes of both are to be found, and *californica* can not be considered a race of *lineare* nor should the name be retained as Caudell has done.¹

MEASUREMENTS (IN MILLIMETERS), OF VARIOUS EXTREMES.

	Arizona.		Mexico.	Argentina.	
	Nogales.	Baboquivari Mts.	Cuernavaca, Morelos.	Misiones. ²	
	Male.	Male.	Males.	Male.	Female.
Length of body.....	11	8.9	10 -14.8	10	10
Length of pronotum.....	1.6	1.6	1.8- 2.1	1.4	1.4
Length of tegmen.....	3	2.9	3.2- 4.3	3	2.9
Length of wings, folded...	4.9	4	4.9- 6.7	4.5	4.1
Length of forceps.....	3.9	3.4	4 - 5.9	4.7	3.1
Length of pygidial spine..	.5	.4	.3- .5	.4	—

Specimens Examined from the United States and Mexico.—136; 71 males, 64 females, 1 nymph.

Texas (from P. R. Uhler), 1 male. Type of *F. exilis*. [Scudder Collection.]

Brownsville, Tex., July 31–Aug. 5, 1912, (H.), 1 male; (Wickham), 1 nymph. [Hebard Collection.]

Piper Plantation near Brownsville, Tex., Aug. 3, 1912 (R. & H.), 1 male. [Hebard Collection.]

Southern Arizona (H. Edwards), 2 males. [Am. Mus. Nat. Hist.]

Camp Grant, 60 mi. E. of Tucson, Ariz. (Palmer), 1 male. [Scudder Collection.]

¹ 1913. Proc. U. S. Nat. Mus., XLIV, p. 596. The effort in this paper to retain also the name *exilis* upon size, coupled with a slight and natural difference in abdominal width, is unwarranted. Study of an extensive series shows that, wherever a number of specimens from the same locality are available for examination, such size variation is found.

² The Territory of Misiones, Argentina, adjoins the State of Santa Catharina, Brazil, the type locality of the present species. The type, a small female, is given as 5 lines (10.5 mm.) long including the forceps, which are $1\frac{1}{2}$ lines (2.7 mm.).

San Bernardino Ranch, Cochise Co., Ariz., 3,750 ft. (Snow), 2 males. [Acad. Nat. Sci. Phila.]

Nogales, Ariz., July 9, 1903 (Oslar), 2 males, 2 females. [Am. Mus. Nat. Hist. and Hebard Collection.]

Sycamore Cañon, Baboquivari Mts., Pima Co., Ariz., Oct. 6-9, 1910, 3,700 ft. (R. & H.), 2 males, 2 females. [Acad. Nat. Sci. Phila. and Hebard Collection.]

Copete Mines, 30 mi. E. of Carbo, Sonora, Mexico (F. V. Nicholas), 3 females. [Am. Mus. Nat. Hist.]

Escuinapa, Sinaloa, Mex. (J. H. Batty), 1 male, 1 female. [Am. Mus. Nat. Hist.]

Guajuca, 20 mi. E. of Monterey, Nuevo Leon, Mex. (Palmer), 2 males. [Scudder Collection.]

Monterey, N. Leon, Mex., March (Palmer), 2 males. [Scudder Collection.]

Victoria, Tamaulipas, Mex. (Barrett), 2 females. [Hebard Collection.]

Vera Cruz, Vera Cruz, Mex. (Sallé), 2 males. [Scudder Collection.]

Medellin, V. C., Mex., 1 male. [Hebard Collection.]

Huatusco V. C., Mex., 1,200 m. (C. Corrizatti), 1 male. [Scudder Collection.]

Jalapa, V. C., Mex., 1 male, 1 female; Aug.-Sept., 2 males, 4 females. [Acad. Nat. Sci. Phila. and Am. Mus. Nat. Hist.]

La Buena Ventura, V. C., Mex., 1 male. [Am. Mus. Nat. Hist.]

Orizaba, V. C., Mex., Jan. 9-16, 1892 (H. Osborn), 2 males; June 6, 1899 (Barrett), 1 male; Jan. 14, 1892 (Bruner), 29 males, 28 females. [Hebard Collection, Acad. Nat. Sci. Phila. and Scudder Collection.]

Texolo, V. C., Mex., 1890 (S. N. Rhoads), 1 male; Aug. (Barrett), 2 females. [Acad. Nat. Sci. Phila.]

Zopopan, Jalisco, Mex., Sept. 11, 1903, 5,500 ft. (Tower), 2 females. [Tower Collection.]

Ocatlan, Jal., Mex., Sept. 1903 (Tower), 1 male. [Tower Collection.]

Queretero, Mex., Nov. 1887 (Bruner), 1 male. [Hebard Collection.]

Joyutla, Morelos, Mexico, Aug. 1903 (Tower), 3 females. [Tower Collection.]

Cuernavaca, Mor., Mex., July 30, 1903, 5,021 ft. (Tower), 2 males, 3 females, in garden in town; slope W. of town, Aug. 1, 1903, 5,200 ft. (Tower), 1 male, semi-arid upland; Feb., June, Sept. (Barrett), 4 males, 2 females. [Tower Collection, Acad. Nat. Sci. Phila. and Hebard Collection.]

Matamoros, Mor., Mex., Aug. 12, 1903 (Tower), 1 male. [Tower Collection.]

Chilpancingo, Guerrero, Mex., 4,000 ft. (H. H. Smith), 1 male. [Acad. Nat. Sci. Phila.]

Chiapas, Mex. (Van Patten), 2 males, 7 females. [Scudder Collection.]

La Zacualpa, Chiapas, Mex., 1 male, 1 female. [Am. Mus. Nat. Hist.]

Male specimens before us showing the extreme condition of delicate, more evenly curved and toothless forceps, come from the following localities; one, Sycamore Cañon, Baboquivari Mts., Ariz.; one, Cuernavaca, Mor., Mex.; one, Rio Madeira, Brazil. The other male from the Baboquivari Mts. also shows this extreme condition except that it possesses a decided inner tooth. The greater part of the rest of the series is more nearly typical of the heavier condition.

Doru aculeatum (Scudder).

1862. *Forficula aculeata* Scudder, Proc. Bost. Soc. Nat. Hist., XVIII, p. 262. (New York; Northern Illinois; Southern Michigan; Cuba?)

1862. *Forficula aculeata* Scudder, Bull. U. S. Geol. Surv. Terr., II, p. 256. (Key.)

Described from a series of three males and five females from three authentic and one questioned locality.



5.

Dorsal outline of *Doru aculeatum*, from Mineral Springs, Indiana.

Single type here designated: male; Southern Michigan. (M. Miles.) [Scudder Collection.]

The wings are not absent in this species, as Scudder states in his

original description, but are merely aborted and hidden under the tegmina; the male forceps are well described by Scudder. Variation is found from this sturdy, more sharply bowed type of male forceps to one in which the curvature is much as in *D. lineare*, these specimens being mainly distinguishable by the aborted and concealed wings and longer pygidial spine. A number of males from Nebraska and Georgia are of this more delicate type, while the single male from Burton, Georgia, shows a decided general increase in size and an accompanying attenuation. In coloration no distinct features exist to separate the present species from *D. lineare*.

MEASUREMENTS (IN MILLIMETERS), OF VARIOUS EXTREMES.

	Mineral Springs, Ind.		Peru, Nebr.		Burton, Ga., Rabun County.		Duckhead, Ga., Fulton County.	
	Males.	Females.	Males.	Females.	Male.	Female.	Male.	Female.
Length of body . . .	9.3-10.9	6.9-8.8	7.8-10.7	8 -9.8	12	9.6	7.8	8.7
Length of pronotum.	1.6- 1.8	1.4-1.8	1.6- 2	1.8-1.9	2	1.8	1.7	1.7
Length of tegmen . .	2.3- 2.7	2 -2.3	2.4- 2.7	2.7-2.8	2.6	2.7	2.1	2.7
Length of forceps...	4.7- 6.3	3 -3.2	3.6- 6.5	3.3-3.6	6.8	3.4	3.8	3.6
Length of pygidial spine.....	.8- 1	—	.8- 1.1	—	.9	—	.7	—

Specimens Examined.—38; 16 males, 19 females, 3 with abdomen missing.

Northern Michigan (M. Miles), 1 male. Type. [Scudder Collection.]

Mineral Springs, Indiana, Oct. 2, 1910 (W. J. Gerhard), 4 males, 3 females. [Acad. Nat. Sci. Phila. and Hebard Collection.]

West Point, Nebraska, May, 1888, 2 males, 2 females. [Hebard Collection ex Bruner.]

Peru, Nebr., May 1, 1910 (Bruner), 6 males, 3 females. [Hebard Collection.]

New York, 1 adult. [Scudder Collection ex Uhler.]

Pennsylvania, 1 female. [Acad. Nat. Sci. Phila.]

Tryon, North Carolina (W. F. Fiske), 1 female, on *Juglans* sp. [U. S. Nat. Mus.]

Cumberland Gap, Kentucky (G. Dimmick, 1 male. [Scudder Collection.]

Burton, Rabun County, Georgia, May 21, 1911, 1,800 ft. (J. C. Bradley), 1 male, 2 females. [Ga. State. Collection.]

Thompsons Mills, Ga., April, 1911 (Allard), 1 female. [U. S. Nat. Mus.]

Austell, Ga., Aug. 6, 1910, 1 female. [Ga. State Collection.]

Buckhead, Fulton County, Ga., April 16, 1911, 1 male, 2 females, 2 adults; Aug. 2, 1913 (R. & H.), 2 females. [Ga. State Collection, Acad. Nat. Sci. Phila. and Hebard Collection.]

Atlanta, Ga., July, 1 female. [Ga. State Collection.]

Doru davisi new species.

Distinguished from its nearest ally, *D. aculeatum*, by the more attenuate general structure, in the male sex by the very much longer pygidial spine and very different forceps.

Type: Male; South Bay, Lake Okeechobee, Florida. May 2, 1912. (Wm. T. Davis.) Hebard Collection.



Doru davisi, n. sp. Dorsal outline of type.



7



8

Lateral outline of male forceps of *Doru aculeatum* (7; Mineral Springs, Indiana) and *Doru davisi* (8; type).

Description of type: Size rather large for genus; form attenuate; surface polished, with abdominal segments very finely punctate excepting the distal segment. Head, pronotum, tegmina and wings as in *D. aculeatum*, the wings aborted and wholly concealed by the tegmina as in that species. Abdomen more produced, the proximal joints more compressed than in *aculeatum*. Forceps longer than abdomen, the proximal fourth stout, triquetral, with the ventro-internal margins of this portion weakly and rather distantly supplied with tubercles. Pygidial spine decidedly acicular, considerably longer than the distal abdominal segment.

Color: In general chestnut brown shading to chestnut on the forceps; limbs, lateral margins of dorsum of pronotum and cephalic portions of tegmina mummy brown.

Allotype: Female; the specimen bears the same data as the type. This specimen is slender and colored much as the type. Otherwise it is inseparable from the same sex of *aculeata*.

In addition to the type and allotype we have three males, nine females and two nymphs, bearing the same data as the type, which may be considered paratypes.

MEASUREMENTS¹ (IN MILLIMETERS).

	Type, Male.	Paratype Male.	Allotype, Female.	Paratype Female.
Length of body.	11	11.6	8.3	8.5
Length of pronotum. . . .	1.9	1.9	1.6	1.6
Length of tegmen.	3	2.7	2.1	2.6
Length of forceps.	8.7	6.6	3.3	3.5
Length of pygidial spine	2.2	1.8	—	—

The present species appears to be the extreme development from a common ancestor with *D. aculeatum*. The tremendously produced pygidial spine is found in another otherwise very different species, *Doru spiculiferum* Kirby, described from New South Wales, Australia.

RECORDS OF DERMAPTERA AND ORTHOPTERA FROM WEST CENTRAL AND SOUTHWESTERN FLORIDA, COLLECTED BY WILLIAM T. DAVIS.

BY JAMES A. G. REHN AND MORGAN HEBARD.

PHILADELPHIA, PA.

In the past two years Mr. Wm. T. Davis, of New Brighton, Staten Island, has submitted to us for examination several series of Dermaptera and Orthoptera taken by him in northern, west central and southwestern Florida. The present paper is an annotated list of the material secured by him in west central and southwestern Florida, the records from northern Florida not being included, as the authors are at present engaged in studying an extensive series from that region and the adjacent portion of Georgia.

¹ These measurements indicate decided variability in the species when the differences between the two known males are noted.

The series here treated comprises six hundred and eight specimens of one hundred and four species, one of which has proved to be new. Many of the records here given are of particular interest as the range of a number of species is extended by the same, while quite a few of the forms represented are but little known and scarce, both in collections and in nature. In addition to this collection a small series of twenty-two specimens, collected by Dr. J. Chester Bradley in the same region, is recorded in this paper.

The authors wish to thank Mr. Davis for his courtesy in permitting them to examine the material here treated, and also for allowing a representation to be retained for the collections of the Academy of Natural Sciences of Philadelphia and the Hebard Collection.

Throughout the present paper the notes in quotation marks have been inserted by the collector, Mr. Davis.

FORFICULIDÆ.

Anisolabis annulipes (Lucas).

Lakeland, Fla., March 28, 1912; 1 female.

La Belle, Fla., April 27, 1912; 1 female.

Everglade, Fla., April, 1912; 2 females.

Anisolabis maritima (Géné).

Useppa, Lee County, Fla., April, 1912; 1 female.

Labidura bidens (Olivier).

Lakeland, Fla., Nov. 8, 1911; 1 female; May 6, 1912; 1 female.

Long Boat Key, Fla. (J. C. Bradley), 1 nymph.

Punta Gorda, Fla., Nov. 16, 1911; 2 males, 2 females.

Fort Myers, Fla., April 23, 1912; 1 female.

Exceedingly great variation in size is shown in the four females before us; the largest, from Fort Myers, being 18.3 mm. in body length, while the length of the smallest, from Lakeland, is but 13.2 mm.

Prolabia unidentata (Beauv.).

Punta Gorda, Fla., Nov. 13, 1911; 1 female: (Charlotte Harbor) (Slosson), 1 male, 4 females. [Scudder Collection.]

Marco, Fla., April 20, 1912; 1 male, 1 female.

All of these specimens belong to the usual apterous form.

Doru davisi R. and H.

South Bay, Lake Okeechobee, Fla., May 1, 2, 1912; 4 males, 10 females, 2 nymphs.

These specimens, including the type of the species, have recently been fully treated and described in the present Journal.

"A winding path led along the shore of South Bay, Lake Okeechobee, between the water and the thick growth of Custard-apple trees, and on the low tangled vegetation bordering this path we found *Doru davisi* in considerable numbers."

BLATTIDÆ.

Ischnoptera nigricollis Walker.

Lakeland, Fla., May 7, 1912; 1 male.

Long Boat Key, Fla. (J. C. Bradley), 1 male.

La Belle, Fla., April 27, 1912; 1 female.

Citrus Center, Fla., May 2, 1912; 1 male.

South Bay, Lake Okeechobee, Fla., April 30, 1912; 1 male.

Marco, Fla., April 17, 1912; 1 male.

Chokoloskee, Fla., April 8, 1912; 1 female.

Everglade, Fla., April, 1912; 2 males, 1 female. (Trapped.)

Ischnoptera coulöniana (Sauss.).

Fort Myers, Fla., March 30, 1912; 1 female.

This specimen has the tegmina subquadrate, with the distal margins quite obliquely subtruncate; this is very different from the normal type of tegmina which is subquadrato-ovate.

The present record is the most southern known for the species.

Ischnoptera uhleriana fulvescens S. and Z.

Lakeland, Fla., May 4, 8, 1912; 2 females: Nov. 10, 1911; 5 nymphs.

Long Boat Key, Fla. (J. C. Bradley), 1 male.

Punta Gorda, Fla., Nov. 13, 14, 15, 1911; 4 nymphs.

*Neoblattella detersa*¹ (Walker).

Lakeland, Fla., May 5, 1912; 1 male.

Everglade, Fla., April 9, 1912; 1 male.

These west coast specimens of the present West Indian species of insect are of particular interest in showing that it is widely distributed throughout southern Florida. The Lakeland record extends the previously known range considerably northward.

Ceratinoptera diaphana (Fabr.).

Lakeland, Fla., March 28, 1912.

Fort Myers, Fla., April 2, 1912.

¹ See Proc. Acad. Nat. Sci. Phila., 1914, p. 379.

***Ceratinoptera lutea* S. and Z.**

Lakeland, Fla., Nov. 8, 9, 1911, May 8, 1912; 1 male, 2 females.

Punta Gorda, Fla., Nov. 15, 16, 1911; 1 male, 1 female, 1 nymph.

Fort Myers, Fla., April 26, 1912; 1 male.

Citrus Center, Fla., May 2, 1912; 1 male.

South Bay, Lake Okeechobee, Fla., April 30, May 1, 1912; 1 male, 1 female.

Everglade, Fla., April, 1912; 1 female (trapped): April 9, 13, 1912; 3 females.

"This and other species of cockroaches were taken in some numbers along Allen's River, Everglade, Lee Co., Fla., in jars baited with the ordinary sugar mixture."

***Eurycotis floridana* (Walker).**

Lakeland, Fla., Nov. 8, 1911; 2 nymphs.

Punta Gorda, Fla., Nov. 11, 13, 15, 1911; 1 male, 2 females.

La Belle, Fla., April 27, 1912; 1 female.

Marco, Fla., April 17, 1912; 1 male.

Everglade, Fla., April 9, 1912; 1 male.

"At night, with the aid of a lantern, this large roach was often found walking about on low bushes, etc., for it is a fair climber in spite of its clumsy appearance."

***Periplaneta americana* (Linn.).**

Lakeland, Fla., Nov. 7, 1911; 1 male (in hotel).

Everglade, Fla., April 5, 1912; 1 male.

***Periplaneta australasica* (Fabr.).**

Punta Gorda, Fla., Nov. 14, 15, 1911; 3 males, 1 nymph.

South Bay, Lake Okeechobee, Fla., May 2, 1912; 1 female.

Allen River to Deep Lake, Fla., April 12, 1912; 1 male.

Everglade, Fla., April 5, 1912; 2 males.

***Periplaneta brunnea* (Burm.).**

Punta Gorda, Fla., Nov. 15, 1911; 1 nymph.

Fort Myers, Fla., April 1, 1912; 1 female.

La Belle, Fla., April 27, 1912; 1 male.

***Pycnoscelus surinamensis* (Linn.).**

Punta Gorda, Fla., Nov. 13, 1911; 2 females, 1 nymph (under board).

Fort Myers, Fla., April 23, 1912; 1 female.

La Belle, Fla., April 27, 1912; 1 nymph.

Everglade, Fla., April 16, 1912; 1 male.

"At Punta Gorda there was a vacant house at the end of the town frequented at night by a Nanny and Billy goat, and on warm evenings many *Periplaneta australasiae* would run about on the piazza floor and on the sides of the house. They were seen feeding on the excrement of the goats and were no doubt to a great degree dependent upon them."

Chorisoneura plocea Rehn.

Lakeland, Fla., May 5, 1912; 1 female.

MEASUREMENTS (IN MILLIMETERS).

	Female.
Length of body	8.4
Length of pronotum	2.1
Greatest width of pronotum	3.
Length of tegmen	7.4
Greatest width of tegmen	2.9

MANTIDÆ.

Stagmomantis carolina (Johannson).

Punta Gorda, Fla., Nov. 13, 1911; 1 female.

South Bay, Lake Okeechobee, Fla., May 1, 1912; 1 very small nymph.

Marco, Fla., April 17, 1912; 1 nymph.

The adult female is the largest specimen of this species we have seen.

MEASUREMENTS (IN MILLIMETERS).

	Female.
Length of body	75.
Length of pronotum	27.5
Greatest width of pronotum	4.9
Length of tegmen	23.
Length of cephalic femur	18.
Length of caudal femur	22.9

Gonatista grisea (Fabr.).

Lakeland, Fla., May 6, 1912; 1 male.

Everglade, Fla., June, 1912; 1 nymph.

Thesprotia graminis (Sc.).

Lakeland, Fla., Nov. 10, 1911; 2 females.

Long Boat Key, Fla. (J. C. Bradley); 1 male.

Punta Gorda, Fla., Nov. 11, 1911; 2 females.

La Belle, Fla., April 27, 1912; 1 male.

South Bay, Lake Okeechobee, Fla., May 1, 1912; 1 female.

Everglade, Fla., April 11, 1912; 1 male.

The largest specimen of the series is from Punta Gorda, measuring 60.5 mm. in length.

PHASMIDÆ.

Manomera tenuescens (Sc.).

Lakeland, Fla., Nov. 8, 1911; 1 female.

Punta Gorda, Fla., Nov. 16, 1911; 1 male.

Allen River to Deep Lake, Fla., April 12, 1912; 1 male.

Manomera brachypyga R. and H.¹

La Belle, Fla., April 27, 1912; 1 female, 1 nymph.

Marco, Fla., April 20, 1912; 1 male, 1 female.

This species, recently described¹ from Southeastern Florida, appears to be distributed like the preceding species over the greater part of the state.

Aplopus mayeri Caudell.

Everglade, Fla., April 10, 1912; 1 female.

This is the first record of the present species from the mainland of Florida.

The specimen before us is armed on the ventral surface of the median and caudal femora with 5-7 and 7-7 spines respectively; all of the females before us from Loggerhead Key, Dry Tortugas, have these margins armed with 4, very seldom 5, spines.

"The fact that this species had not been recorded from the mainland of Florida was realized when it was beaten into an umbrella from the branch of a large tree growing on the edge of the low ground at Everglade, Lee Co., and considerable effort was made to find other specimens, but without success."

Anisomorpha buprestoides (Stoll).

Punta Gorda, Fla., Nov. 16, 1911; 1 very small nymph.

Citrus Center, Fla., May 2, 1912; 1 male, 1 female nymph.

Everglade, Fla., April 7, 1912; 1 female.

"When disturbed this insect shoots from two pores on the prothorax a milky fluid that smarts considerably when it touches one's

¹ 1914. Proc. Acad. Nat. Sci. Phila., 1914, p. 384.

face, and would undoubtedly cause much irritation if received in the eyes. The female of the species being much larger than the male, has a more powerful and copious battery at her command."

ACRIDIDÆ.

Nomotettix floridanus Hanc.

Lakeland, Fla., May 8, 1912, Nov. 9, 10, 1911, 2 males, 4 females, 1 female nymph.

Fort Myers, Fla., March 31, April 23, 1912; 3 females.

La Belle, Fla., April 27, 1912; 1 male.

The present form may be separated from New England representatives of *N. cristatus* by the following characters: vertex less elevated above the eyes; fastigium more acute in lateral aspect; tegmina smaller and more abbreviate; median femora narrower with dorsal margin showing a faint sinuation.

Acrydium blatchleyi Hanc.

Deep Lake, Fla., April 13, 1912; 2 females.

The present species appears to be very distinct from its nearest ally, *A. gibbosus*. This is the first record of the species since it was described from two females, taken at Ormond, Florida, on April 9, 1899, by W. S. Blatchley.

The specimen before us is wholly typical except that it is slightly smaller than the types.

MEASUREMENTS (IN MILLIMETERS).

	Female.
Length of body	9.
Length of pronotum	8.6
Length of tegmen	1.4
Length of caudal femur	5.

Neotettix femoratus (Sc.).

Lakeland, Fla., May 5, 1912; Nov. 10, 1911; 2 males, 2 females.

Punta Gorda, Fla., Nov. 14, 1911; 1 male, 1 female. 1 male, elongate type.

Fort Myers, Fla., March 31, April 23, 26, 1912; 2 males, 1 female.

La Belle, Fla., April 27, 28, 1912; 1 male, 2 females.

Neotettix coarctatus Hanc.

Punta Gorda, Fla., Nov. 12, 14, 16, 1911; 5 males, 13 females, 1 male nymph, 8 female nymphs. 3 males, 4 females, elongate type.

Fort Myers, Fla., April 23, 26, 1912; 1 male, 3 females.

South Bay, Lake Okechobee, Fla., April 30, 1912; 1 female.

Paratettix rugosus (Sc.).

Lakeland, Fla., Aug. 16, 1910 (J. C. Bradley), 1 male: Nov. 9, 1911; 1 female.

Long Boat Key, Fla., (J. C. Bradley), 1 male, 1 female.

Punta Gorda, Fla., Nov. 12, 16, 1911; 13 males, 16 females.

South Bay, Lake Okeechobee, Fla., April 30, 1912; 1 female.

Deep Lake, April 13, 1912; 1 female.

Everglade, Fla., May, 1912; 1 male.

Tettigidea lateralis (Say).

Lakeland, Fla., May 4, 1912, Nov. 8, 9, 10, 1911; 4 males, 10 females, 5 female nymphs.

Punta Gorda, Fla., Nov. 12, 14, 16, 1911; 9 males, 14 females, 8 female nymphs.

Fort Myers, Fla., March 30, April 23, 1912; 3 females.

Everglade, Fla., May, 1912; 1 female.

All of the adults in the present series are of the elongate type.

Tettigidea spicata Morse.

South Bay, Lake Okeechobee, Fla., May 1, 1912; 1 female.

Everglade, Fla., May, 1912; 2 females.

Tettigidea armata Morse.

Deep Lake, April 13, 1912; 1 male, 1 female.

Radnotatum brevipenne peninsulare R. and H.

Long Boat Key, Fla. (J. C. Bradley), 1 female.

Punta Gorda, Fla., Nov. 14, 1911; 1 female.

Fort Myers, Fla., March 31, 1912 (nymphal), April 23, (adult); 2 females.

La Belle, Fla., April 27, 1912; 1 male.

Marco, Fla., April 19-21, 1912; 1 male, 3 females (one pair in coitu).

Allen River to Deep Lake, Fla., April 12, 1912; 1 female.

These specimens are typical of the race *peninsulare*. In addition we have examined in Mr. Davis' series two males and four females from Lakeland (May 7-8, 1912, and November 7-10, 1911), which are absolutely intermediate between typical *brevipenne* and *b. peninsulare* in character.

Truxalis brevicornis (Johannson).

Everglade, Fla., July, 1912; 1 female.

This is the largest individual of the species we have seen, a series of forty-four females from localities ranging from New Jersey to Buenos Aires, Argentina, containing none equalling the present specimen in size. The principal measurements are as follows: length of body, 39.5 mm.; length of pronotum, 7.8; length of tegmen, 38; length of caudal femur, 25.

Mermiria intertexta Sc.

Punta Gorda, Fla., Nov. 15, 1911 (C. W. Leng); 1 female.

Everglade, Fla., July, 1912; 1 female.

Macneillia obscura (Sc.)

Lakeland, Fla., Nov. 8, 1911; 1 female.

This specimen has a complete dorsal medio-longitudinal pinkish buff line of subequal width.

Amblytropidia occidentalis (Sauss.).

Lakeland, Fla., March 29, 1912, Nov. 9, 1911; 1 male, 1 female.

Fort Myers, Fla., April 24, 1912; 1 male.

Marco, Fla., April 20, 1912; 1 male.

Everglade, Fla., April 11, 1912; 1 female.

Deep Lake, Fla., April 13, 1912; 2 males.

A Deep Lake male is the smallest of that sex, while the one from Marco is the largest. The two females are of nearly equal size, agreeing with a Tampa female in this respect.

Orphulella pelidna Burm.

Lakeland, Fla., Nov. 8, 1911; 2 males, 3 females; May 4-8, 1912, 2 males, 2 females.

Punta Gorda, Fla., Nov. 11-13, 1911; 3 males, 2 females, 2 nymphs.

Fort Myers, Fla., March 30, 1912; 1 male; April 24, 1912, 1 male.

La Belle, Fla., April 27, 1912; 1 male, 5 females.

South Bay, Lake Okeechobee, Fla., 1912, May 1, 1912; 1 male, 1 female.

Deep Lake, Fla., April 13, 1912; 2 males.

Dichromorpha viridis (Sc.).

Lakeland, Fla., May 4, 1912, Nov. 7-9, 1911; 2 males, 7 females.

Punta Gorda, Fla., Nov. 11 and 16, 1912; 2 males, 2 females.

Fort Myers, Fla., April 23, 1912; 1 male.

La Belle, Fla., April 27, 1912; 1 female.

Citrus Center, Fla., May 2, 1912; 1 male, 1 female.

South Bay, Lake Okeechobee, April 29, 1912; 1 male.

Deep Lake, Fla., April 13, 1912; 1 female.

The females represent the dark brown phase, the pale brown phase and the green phase; the males are of the entirely green phase, the green dorsum phase and the pale dorsum phase. The Lakeland series represents all of these phases except the pale brown phase of the male. The entirely green phase of the male is found in only a single Lakeland specimen and this condition is apparently quite unusual judging by the series in our collections. Individually the present series shows considerable variation in size.

***Clinocephalus elegans pulcher* R. and H.**

Lakeland, Fla., Nov. 9, 1911; 1 female.

Long Boat Key, Fla. (J. C. Bradley); 2 males, 1 female.

Everglade, Fla., May, 1912; 1 female.

These specimens are typical of the race *pulcher*.

***Arphia granulata* Sauss.**

Lakeland, Fla., May 6, 1912, Nov. 8, 1911; 2 males.

Punta Gorda, Fla., Nov. 17, 1911; 1 female.

Fort Myers, Fla., April 25, 1912; 1 male.

La Belle, Fla., April 27, 1912; 1 male.

Marco, Fla., April 17, 1912; 1 male.

The Punta Gorda female is quite blackish in general dorsal color, the caudal femora drab proximad and with the usual two dark bands (mesad and distad) strongly indicated dorsad, the distal one of these equally indicated laterad. The Lakeland and La Belle individuals are quite reddish, varying in general tone from kaiser brown to chestnut, while the Fort Myers and Marco specimens approach cinnamon-brown in general color, with the face and part of the genæ buckthorn brown. The reddish and brownish individuals have the usual two distal femoral bars indicated more or less distinctly dorsad, but only faintly or not at all so laterad.

***Chortophaga australior* R. and H.**

Lakeland, Fla., May 4, 1912, Nov. 8, 1911; 2 males, 1 female.

Sarasota, Fla., Aug. 14, 1900 (J. C. Bradley), 2 males, 3 females.

Long Boat Key, Fla. (J. C. Bradley), 2 males, 2 females.

Punta Gorda, Fla., Nov. 11-17, 1911; 4 males, 2 females.

Fort Myers, Fla., April 26, 1912; 1 female.

La Belle, Fla., April 27, 1912; 1 male, 1 female.

Marco, Fla., April 17, 1912; 1 male.

Everglade, Fla., May, 1912; 1 female.

Deep Lake, Fla., April 13, 1912; 1 female.

The green phase is represented by four females from Lakeland, Punta Gorda, Fort Myers and La Belle. The other Punta Gorda specimen of that sex has the discoidal trunk of the tegmina greenish.

Hippiscus phoenicopterus (Burm.).

Lakeland, Fla., May 7, 1912; 1 male.

The present specimen has the dorsal and ventral lamellate carinations of the caudal femora considerably more pronounced than in northern specimens of the species. This character may be racial, but we wish to defer comment until more material from central Florida is available.

Scirtetica marmorata picta (Sc.).

Lakeland, Fla., May 5, 1912, November 8-10, 1912; 3 males, 2 females.

Fort Myers, Fla., March 30, 1912; 1 male.

Marco, Fla., April 18, 1912; 1 male, 1 female.

One Lakeland male is distinctly smaller than any other individual of that sex seen by us. In general coloration this specimen shades from buff-pink on the face and genæ to walnut brown on the tegmina, the usual maculations of the latter but faintly indicated, the caudal femoral bars decided, but only on the dorsal face.

Psinidia fenestralis (Serv.).

Lakeland, Fla., March 28, May 4, 1912, Nov. 18, 1911; 3 males, 1 female.

Fort Myers, Fla., April 25, 1912; 1 female.

La Belle, Fla., April 27, 1912; 1 male.

Trimerotropis citrina Sc.

St. Petersburg, Fla., Aug. 12, 1910 (J. C. Bradley), 1 male.

Fort Myers, Fla., April 23, 1912; 1 male.

Romalea microptera (Beauv.).

Punta Gorda, Fla., Nov. 15, 1911; 1 male.

La Belle, Fla., April 28, 1912; 1 male.

Citrus Center, Fla., May 2, 1912; 1 male.

"The Species was found in numbers at Punta Gorda in November, 1911, but was not common at any of the localities visited in the spring of 1912. At Punta Gorda they were feeding on a papilionaceous plant along an old railroad embankment and when disturbed would walk off in an amusingly stately, dignified manner. This lubber grasshopper can make a hissing sound, which is produced by the air being forced from the large stigmata near the base of the wings. This was more particularly noticed in recently matured individuals."

Leptysma marginicollis (Serv.).

Lakeland, Fla., May 7, 1912; 1 male.

Fort Myers, Fla., April 23, 1912; 1 male.

Citrus Center, Fla., May 2, 1912; 1 male.

Marco, Fla., April 20, 1912; 1 female.

Allen River to Deep Lake, Fla., April 12, 1912; 1 female.

Everglade, Fla., April 5, 1912; 1 male.

Stenacris vitreipennis (Marschall).

Arnilia chlorizans of authors.

Lakeland, Fla., Nov. 7, 10, 1911; 1 male, 3 females, 1 nymph.

Punta Gorda, Fla., Nov. 11, 13, 17, 1911; 4 males, 3 females.

Fort Myers, Fla., April 1, 1912; 1 male.

Citrus Center, Fla., May 2, 1912; 1 male.

South Bay, Lake Okeechobee, Fla., April 29, May 1, 1912; 1 male, 1 female.

Schistocerca alutacea (Harris).

Punta Gorda, Fla., Nov. 15, 17, 1911; 1 male, 1 female.

These specimens are both of the brown phase.

Schistocerca obscura (Fabr.).

Lakeland, Fla., Nov. 7, 1911; 1 female.

Punta Gorda, Fla., Nov. 11, 15, 1911; 2 males.

Schistocerca americana (Drury).

Long Boat Key, Fla. (J. C. Bradley), 1 male.

La Belle, Fla., April 27, 1912; 1 male.

South Bay, Lake Okeechobee, Fla., May 1, 1912; 1 female.

Puntarassa, Fla., April 3, 1912; 1 female.

Schistocerca damnifica calidior R. and H.

Lakeland, Fla., Nov. 7, 9, 1911, May 6, 1912; 3 females.

La Belle, Fla., April 27, 1912; 1 male.

Marco, Fla., April 21, 1912; 1 male.

Gymnoscirtetes pusillus Sc.

Lakeland, Fla., Nov. 9, 1911; 1 female.

This species has previously been recorded only from northern Florida and southern Georgia.

Eotettix signatus Sc.

Lakeland, Fla., Nov. 10, 1911; 1 female.

Melanoplus puer Sc.

Lakeland, Fla., May 8, 1912, Nov. 8, 10, 1911; 6 males, 1 female.

Punta Gorda, Fla., Nov. 11, 13, 14, 1911; 5 males, 2 females, 1 male nymph, 1 female nymph.

Fort Myers, Fla., April 1, 1912; 1 male nymph.

Marco, Fla., April 19, 1912; 1 male.

"At Lakeland *Melanoplus puer* was not uncommon in a field overgrown with *Eupatorium capillifolium*."

Melanoplus rotundipennis Sc.

Lakeland, Fla., May 4, 5, 1912, Nov. 7, 1911; 1 male, 2 females.

Melanoplus propinquus Sc.

Lakeland, Fla., Nov. 7, 8, 9, 1911, May 4, 5, 1912; 4 males, 4 females.

Marco, Fla., April 18, 1912; 1 male.

Melanoplus keeleri (Thomas).

Lakeland, Fla., Nov. 8, 1911; 1 male, 1 female.

Paroxya atlantica Sc.

Lakeland, Fla., Nov. 10, 1911, May 8, 1912; 2 males.

Punta Gorda, Fla., Nov. 11, 13, 16, 1911; 4 males.

Fort Myers, Fla., April, 1912; 1 male.

La Belle, Fla., April 28, 1912; 1 male.

Citrus Center, Fla., May 2, 1912; 1 male, 1 female.

South Bay, Lake Okeechobee, Fla., April 29, 1912; 1 male.

Marco, Fla., April 17, 1912; 1 male.

Allen River to Deep Lake, Fla., April 12, 1912; 1 male.

Deep Lake, Fla., April 13, 1912; 1 female.

Everglade, Fla., April 11, 1912; 1 male.

No approach to *P. atlantica paroxyoides* is shown in the above series, all of the specimens belonging to the smaller, more attenuate south Florida type of *atlantica*.

Paroxya floridiana (Thom.).

Citrus Center, Fla., May 2, 1912; 1 female.

South Bay, Lake Okeechobee, Fla., May 2, 1912; 1 female.

Allen River to Deep Lake, Fla., April 12, 1912; 1 male.

Everglade, Fla., April 6, 1912; 1 male.

Aptenopedes clara Rehn.

Lakeland, Fla., May 7, 1912, Nov. 7-10, 1911; 12 males, 8 females, 1 male nymph.

Punta Gorda, Fla., Nov. 11-16, 1911; 4 males, 4 females.

Fort Myers, Fla., March 30, 1912; 1 male.

La Belle, Fla., April 28, 1912; 1 male.

Marco, Fla., April 20, 1912; 1 female.

The series from Lakeland is not typical as all of the specimens show, to a moderate degree, an approach to *A. sphenarioides*. The furcula in some cases are narrow and noticeably produced, the supra-anal plate is frequently somewhat narrower than in typical *clara* and the cerci are much shorter with the falcate distal portion greatly modified. The evidence strongly indicates that material from north central Florida will prove to be intermediate between *sphenarioides* and *clara*, and the latter will therefore prove to be a geographic race.

Aptenopedes aptera Sc.

Tampa, Fla., Nov. 23, 1911 (Engelhardt); 1 male. [Museum Brooklyn Inst. Arts and Sci.]

Punta Gorda, Fla., Nov. 14, 1911; 1 male, 1 female.

Marco, Fla., April 19, 1912; 1 female.

TETTIGONIIDÆ.**Arethaea phalangium** (Sc.).

Fort Myers, Fla.,¹ April 23, 1912; 1 female nymph.

Scudderia texensis Sauss. and Pictet.

Lakeland, Fla., Nov. 7, 1911; 1 female.

Fort Myers, Fla., April 24, 1912; 1 male.

La Belle, Fla., April 27-28, 1912; 1 male, 1 female.

Marco, Fla., April 21, 1912; 1 male.

Scudderia furcata Brunner.

Lakeland, Fla., May 7, 1912; 1 male.

¹ Vide Trans. Amer. Entom. Soc., XL, p. 141.

This is the first exact record of the species from Florida south of Jacksonville.

Amblycorypha floridana R. and H.

La Belle, Fla., April 27, 1912; 1 female.

Citrus Center, Fla., May 2, 1912; 1 male, 1 female.

South Bay, Lake Okeechobee, Fla., April 29-30, 1912; 1 male, 1 female.

These specimens are typical of the species.

Microcentrum rhombifolium (Sauss.).

Punta Gorda, Fla., Nov. 17, 1911; 1 female.

Fort Myers, Fla., March 31 and April 2, 1912; 2 males.

Microcentrum rostratum R. and H.

Punta Gorda, Fla., Nov. 11-17, 1911; 2 males, 1 female, 1 female nymph.

Puntarassa, Fla., April 3, 1912; 1 male.

Everglade, Fla., April 5, 1912; 1 female.

While fully typical of the species these individuals are all slightly larger than Miami and Key West specimens.

"At Punta Gorda this insect was not uncommon in a clump of mangroves and the males were captured at night by following up their short *click click* song, the notes of which were often uttered close together."

Stilpnochlora marginella (Serv.).

Fort Myers, Fla., March 31, 1912 (at light); 1 male.

This specimen is very slightly larger than a male, labelled "Fla.," in the collection of the Academy of Natural Sciences of Philadelphia.

"This species cannot be very uncommon at Fort Myers, for several of them were attracted to a strong electric light on the edge of the town, though I was able to secure but one male."

Belocephalus sabalis Davis.¹

Originally described from Punta Gorda, Fla., on the basis of material collected in November, 1911, this species is now known to range considerably to the southward.

Belocephalus hebardi Davis.²

This species was described from material collected at Punta Gorda, Fla., in November, 1911.

¹ Journ. N. Y. Entom. Soc., XX, p. 123.

² *Ibid.*, p. 123.

Pyrgocorypha uncinata (Harris).

Marco, Fla., April 17, 1912; 1 male.

Chokoloskee, Fla., April 8, 1912; 1 male.

Everglade, Fla., April 11, 1912; 1 male.

"The Chokoloskee male was found hidden away in the day time among some dead leaves on a branch of an alligator-pear tree lying on the ground and was so active when disturbed that it would probably have escaped if it hadn't been somewhat deformed. The individuals from Marco and Everglade were collected at night, attention being drawn to them by their song which resembles *azik, azik, azik, azik*. They were very shy when singing and difficult to capture."

Neoconocephalus mexicanus (Sauss.).

Fort Myers, Fla., April 23, 1912; 1 female.

South Bay, Lake Okeechobee, Fla., April 30, 1912; 1 female.

Marco, Fla., April 17, 1912; 1 male.

Allen River to Deep Lake, Fla., April 12, 1921; 1 female.

Everglade, Fla., April 5 and 7, 1912; 1 male, 1 female.

The Fort Myers female and the Everglade male are of the brown phase (*fusco-striatus*). The Marco male has the fastigium with no black, a condition noted by us in Costa Rican specimens of the species.

Homorocoryphus malivolans (Sc.).

Citrus Center, Fla., May 2, 1912; 2 males.

These specimens fully agree with the male of the species from Detroit, Dade County, Florida, recently recorded by us.¹

Odontoxiphidium apterum Morse.

Lakeland, Fla., Nov. 7-10, 1911; 5 males, 4 females.

Punta Gorda, Fla., Nov. 16, 1911; 1 female.

The Punta Gorda female has the ovipositor relatively very long, about one and one-half times the body length. The Lakeland females have the ovipositor length varying from somewhat shorter than the length of the body to one and one third times the same. The United States National Museum collection contains two males of this species from Lemon City (E. J. Brown) and Fort Drum (Sept. 20, 1903; A. Fredenholm), Florida.

Orchelimum glaberrimum (Burm.).

Everglade, Fla., July, 1912; 1 male, 1 female.

This is the most southern record of the species in Florida. The

¹ Proc. Acad. Nat. Sci. Phila., 1914, p. 405.

female specimen has the head entirely deep red, while the male shows evidence of similar coloration in life.

Orchelimum molossum R. and H.

Lakeland, Fla., Nov. 7-10, 1911; 8 males, 2 females.

Everglade, Fla., May, 1912, July; 1 male, 1 female.

These records are the most southern known for the species.

"The song is quite like that of *Orchelimum vulgare* Harris of the northeastern states."

Orchelimum pulchellum Davis.

Lakeland, Fla., Nov. 7, 1911; 2 males.

Orchelimum concinnum Sc.

Punta Gorda, Fla., Nov. 16, 1911; 1 male.

Fort Myers, Fla., April 23, 1912; 1 male, 1 female.

South Bay, Lake Okeechobee, Fla., April 30, 1912; 2 males, 1 female.

The facial maculation is decided in the Punta Gorda specimen and weakly or moderately indicated in the others.

Conocephalus gracillimus (Morse).

Tampa, Fla. (J. C. Bradley), 1 female.

St. Petersburg, Fla. (J. C. Bradley), 1 male.

Punta Gorda, Fla., Nov. 13-15, 1911; 1 male, 2 females.

The Punta Gorda male is quite small. Tampa and the present localities are the only ones in western Florida from which the species is known.

Conocephalus fasciatus (DeGeer).

Lakeland, Fla., May 7, 1912, Nov. 7-10, 1911; 11 males, 8 females.

Tampa, Fla. (J. C. Bradley), 2 females.

Punta Gorda, Fla., Nov. 11-15, 1911; 1 male, 2 females.

Fort Myers, Fla., April 23, 1912; 2 males.

Several of the Lakeland specimens are quite purplish on the tegmina and in most of the Lakeland and Punta Gorda individuals the median dark bar on the head and pronotum is nearly solid or has the lateral margins strongly infuscate. One Lakeland female and the Fort Myers pair are yellowish and have the dark bar but weakly or not at all indicated.

These are the first records of the species from western Florida south of Cedar Keys and Gainesville.

Conocephalus spartinæ (Fox).

Everglade, Fla., April 9-11, 1912; 3 males, 3 females.

From this material it is evident that the present species ranges south to southern Florida and is also dimorphic in the length of the tegmina and wings. One pair from Everglade are of the normal brachypterous type, as seen when compared with the type and paratypes now before us, while the other two pairs are decidedly macropterous, the wings surpassing the tips of the caudal femora by at least the dorsal length of the pronotum. In this latter phase *spartinæ* strongly resembles *fasciatus* in superficial appearance.

Atlanticus glaber R. and H.

Marco, Fla., April 20-21, 1912; 1 male, 1 female.

This is the first record of this very interesting species since its description and the present material fully agrees with the type and allotype. In the male the coloration of the dorsum is a uniform russet, while the female has a narrow median line of blackish extending from the fastigium to the apex of the abdomen, this being divided mesad by a thread of the general color. The lateral pronotal lobes of the female show almost no infuscation.

The range of the species is now known to cover the southwestern as well as the southeastern portion of peninsular Florida.

"These insects were secured by treading closely and more or less shoving my feet through the tangled grass in a small, moist, fresh meadow in the interior of Key Marco."

GRYLLIDÆ.**Scapteriscus abbreviatus** Sc.

Fort Myers, Fla., March 31, April 23, 1912; 1 male, 1 nymph.

Ellipes minuta (Sc.).

Fort Myers, Fla., Nov. 14, 1911; 5 males, 1 female. Four are macropterous.

Cryptoptilum antillarum (Redt.).

Marco, Fla., April 17, 1912; 1 male.

Cryptoptilum trigonipalpus R. and H.

South Bay, Lake Okeechobee, Fla., May 1, 2, 1912; 4 males, 1 female.

Cycloptilum squamosum Sc.

Lakeland, Fla., May 5, 1912; 1 male, 1 female.

Nemobius fasciatus socius Sc.

Lakeland, Fla., May 4, 6, 7, 1912; 1 male, 2 females. 2 females, macropterous.

Fort Myers, Fla., March 30, 31, April 1, 22, 23, 26, 1912; 9 males, 12 females. 9 males, 11 females, macropterous.

Everglade, Fla., April 9, 1912; 2 males, 1 female. All brachypterous.

The large percentage of macropterous individuals in this series, practically 80 per cent., is unusual. One of the males from Everglade is exceptionally large.

Nemobius ambitiosus Ss.

Lakeland, Fla., March 28, 1912, May 4, 5, 8, 1912; 3 males, 4 females.

Fort Myers, Fla., April 26, 1912; 1 male.

La Belle, Fla., April 27, 1912; 1 male.

Nemobius cubensis Sauss.

Fort Myers, Fla., April 23, 1912; 1 male.

La Belle, Fla., April 27, 1912; 1 male.

South Bay, Lake Okeechobee, Fla., May 2, 1912; 1 male.

Everglade, Fla., April 7, 14, 1912; 2 females.

All of the above specimens are macropterous.

Nemobius carolinus Sc.

Lakeland, Fla., April 28, May 7, 1912; 1 male, 1 female.

Fort Myers, Fla., March 31, April 22, 23, 1912; 1 male, 3 females.

La Belle, Fla., April 27, 1912; 1 female.

Everglade, Fla., April 5, 11, 1912; 1 male, 1 female.

All of the specimens in the above series are macropterous with the exception of the single female from Everglade. This macropterous condition is predominant in southern Florida.

Miogryllus saussurei (Sc.).

Deep Lake, Fla., April 13, 1912; 2 males.

Both of these specimens are very dark in coloration, the dorsal portion of the head is uniform shining black.

Gryllus firmus Sc.

Rital, Fla., Nov. 18, 1911; 1 male.

Lakeland, Fla., Nov. 8, 9, 17, 1911; 1 male, 2 females.

Sarasota, Fla., Aug. 14, 1910 (J. C. Bradley), 1 female.

Punta Gorda, Fla., Nov. 13, 14, 15, 16, 1911; 3 males, 7 females.

La Belle, Fla., April 27, 1912; 1 female.

South Bay, Lake Okeechobee, Fla., May 1, 1912; 1 female.

Marco, Fla., April 19, 1912; 1 female.

Everglade, Fla., April 10, May, 1912; 2 females.

Gryllus rubens Sc.

Lakeland, Fla., March 28, 1912, Nov. 7, 8, 9, 10, 1911; 4 males, 5 females.

Punta Gorda, Fla., Nov. 16, 1911; 1 female.

Fort Myers, Fla., March 30, 1912; 1 female.

South Bay, Lake Okeechobee, Fla., April 30, 1912; 1 female.

Gryllodes sigillatus (Walker).

Lakeland, Fla., May 4, 1912; 1 male: Nov. 8, 1911; 1 nymph.

Fort Myers, Fla., April 1, 1912; 1 female (at light).

These records are the most northerly for the genus and species in the United States, secured under normal and unprotected conditions.

Oecanthus angustipennis Fitch.

Lakeland, Fla., May 5, 1912, Nov. 10, 1911; 1 male, 2 nymphs.

This is the first Florida record of the species.

"This insect was identified in the field and considerable effort made to secure additional specimens, but they were uncommon."

Oecanthus quadripunctatus Beut.

Lakeland, Fla., Nov. 8, 1911; 1 male.

Fort Myers, Fla., April 23, 1911; 1 male, 1 female.

The only previous Florida records of this species were from Cedar Keys and Pablo Beach (R. and H.).

Anaxipha pulicaria (Burm.).

South Bay, Lake Okeechobee, Fla., May 1, 2, 1912; 1 male, 2 females.

Cyrtoxipha gundlachi Sauss.

Punta Gorda, Fla., Nov. 13-17, 1911; 1 male, 6 females, 3 nymphs. Two marked "on Mangrove."

These specimens average smaller than the Key West and Miami individuals, otherwise they are inseparable.

Hapithus quadratus Sc.

Lakeland, Fla., Nov. 9, 1911; 1 nymph.

Fort Myers, Fla., March 31, 1912; 1 female.

South Bay, Lake Okeechobee, Fla., May 1, 2, 1912; 3 males, 3 females.

Marco, Fla., April 17, 1912; 1 nymph.

Everglade, Fla., June 1912; 1 female.

***Orocharis saulcyi* (Guerin).**

Useppa Island, Lee County, Fla., April 1912; 1 male.

Everglade, Fla., April 6, 1912; 1 male, 1 female.

Useppa Island is the most northern locality from which this West Indian type has been recorded.

***Tafalisca lurida* Walker.**

Punta Gorda, Fla., Nov. 17, 1911; 1 nymph.

Naples, Fla. (Scudder Collection), 1 nymph.

Marco, Fla., April 17, 1912; 1 nymph.

The Marco specimen is a male in the instar preceding maturity, while the Punta Gorda nymph is a much less developed female.

THE CRANEFLIES COLLECTED IN COSTA RICA BY DR. P. P. CALVERT. (TIPULIDÆ, DIPTERA).

BY CHARLES P. ALEXANDER,

ITHACA, N. Y.

While collecting the dragonfly material for the *Biologia Centrali-Americana*, Dr. P. P. Calvert secured a very considerable number of specimens of other orders of insects. A few of the crane-flies that were taken have been considered by the author in other papers.¹ The majority of the new forms have been left for this paper, however, and a complete list of the material secured is herein included. The crane-flies of the collection form a small but interesting lot and I am indebted to Dr. Calvert and to Mr. E. T. Cresson, Jr., for the privilege of studying these forms. The type-material is in the collection of the American Entomological Society at the Academy of Natural Sciences, Philadelphia.

¹ *Vide* Bull. Brook. Ent. Soc., Vol. 8, Oct., 1912; Proc. U. S. Nat. Mus., Vol. 44, No. 1966, Apr., 1913.

SUBFAMILY LIMNOBINÆ.

Tribe LIMNOBINI.

Genus **DICRANOMYIA** Stephens.**Dicranomyia omissa** Alexander.

One male and one female specimen from near Cartago, C. R., altitude 5,000 feet. They were taken on Dec. 15, 1909, over mud on the south slope of Irazu, by Dr. P. P. Calvert. One female from the Rio Siquiaries, Turrucare, C. R., on Dec. 19, 1909. The specimens from Irazu are much larger than the type but undoubtedly belong to this same species.

Genus **RHIPIDIA** Meigen.Subgenus **Conorhipidia** new subgenus.

I propose this new subgeneric term for those species of the genus in which the mesonotal præscutum is produced dorsad into a prominent conical protuberance. Two species are known to me, *conica* Alexander, which is the type of the subgenus, and the smaller form described below as *punctipennis*.

Rhipidia (Conorhipidia) punctipennis new species.

Thoracic mesonotum produced into a conical point; wings with dark markings small and sparse.

Female, length, 5.3–5.6 mm.; wing, 6.8 mm.

Female.—Rostrum and palpi dark brown; the antennæ light brown with pale hairs, the petioles of each segment pale. Head light gray.

Pronotum and cervical sclerites brown. Mesonotal præscutum with a conspicuous conical protuberance as in the subgenus; pale yellow in front, rich brown behind the conical point; scutum, scutellum and postnotum brown. Pleuræ light yellow, except the meso- and meta-pleuræ above the coxæ, which are brown; a shiny brown spot before the root of the wing and another near the stigma. Halteres pale, the knob scarcely darker. Legs, fore coxæ yellow, hind and middle coxæ brown; trochanters, femora and tibiæ light yellow, the tarsi a little more darkened. Wings pale yellowish hyaline with a few scattered brown dots as follows: one at the origin of *Rs*; one on crossvein *r*; one at the base of *R* 4 + 5; one at the fork of *Cu* on *Cui* 1, indistinct dots at the tips of the veins; a rounded brown spot before the tip of *2d anal*. Venation as in fig. 1.

Abdomen yellowish brown with a row of about five brown marks on the pleuræ, the most anterior of which is very small, rounded.

Holotype, ♀, Rio Siquiaries, Turrucare, C. R., alt., 2,200 ft.; Aug. 14, '09; (Dr. P. P. Calvert).

Paratype, ♀, with the type.

Type in the collection Acad. Nat. Sci. Phil.; the paratype in the author's collection. The shape of the thorax, from the side, is shown in Fig. 10.

Rhipidia (Arhipidia) domestica Osten Sacken.

One male and two females from near Cartago, C. R., altitude 5,000 ft.; Dec. 15, '09; they were taken on the south slope of Irazu, over mud. One male from Cartago, Oct. 27, '09.

Rhipidia (Rhipidia) calverti Alexander.

The type, a male, was taken at Bonnefil farm, Rio Surubres, C. R., alt. 700 feet; Oct. 29, '09, by Dr. Calvert.¹

Rhipidia (Rhipidia) costalis Williston.

One very small female of this species from Rio Siquiares, Turrucares, C. R., alt. 2,200 ft., Aug. 14, '09. This is the first representative of the species that I have seen and a figure of its venation is herein included (Fig. 2). The basal deflection of Cu_1 is at the fork of M as in this group of species.

Genus **GERANOMYIA** Haliday.

Geranomyia tristis Loew.

Two specimens, one of each sex, from Cache, C. R., Mar. 3, '10.

Geranomyia sp.

One female from Alajuela, C. R., alt. 3,100 ft., Sept. 15, '09. The specimen is of a small reddish form with hyaline wings but the condition of the material forbids closer determination.

Tribe **ANTOCHINI**.

Genus **TEUCHOLABIS** Osten Sacken.

Teucholabis trifasciata Enderlein.

One female of this species from Alajuela, C. R., alt. 3,100 ft., Sept. 15, '09. As I have indicated in another paper, this species is the same as the *Limnobia bifasciata* of Fabricius.

Genus **TOXORHINA** Loew.

Toxorhina centralis Alexander.

One female from Cache, C. R., near a stagnant pool, bank of the Rio Reventazon; Mar. 10, '10.

¹ See Bull. Brook. Ent. Soc., Vol. 8, Oct. 1912, p. 8-10, fig. *d* and *h*.

Tribe ERIOPTERINI.

Genus **RHABDOMASTIX** Skuse.Subgenus **Rhabdomastix** Skuse.**Rhabdomastix (Rhabdomastix) septentrionalis**, new species.

Antennæ of the male very long; color of the body dark brown; the stigmal spot of the wings pale.

Male, length, 6 mm.; wing, 7 mm.; antennæ (only twelve segments remaining) 15.5 mm.

Male.—Antennæ with the basal segment very large, light brown, flagellum yellowish brown. Head brown with a light gray bloom.

Mesonotum dark brown, the pseudosutural fovea not conspicuous; scutum, scutellum and postnotum light brown. Pleuræ light brown with a sparse grayish bloom. Halteres pale yellow. Legs, coxæ, brown with a sparse gray bloom, trochanters dull yellow, femora dull yellow, tibiæ light brown, tarsi brown. Wings light gray, stigma oval, gray, rather indistinct, veins dark brown. Venation (see fig. 3): $R\ 2 + 3$, long, rather longer than vein $R\ 2$ alone.

Abdomen dark brown, the apical margins of the sclerites paler, brown; hypopygium yellowish.

Holotype, male, Alajuela, C. R.: alt. 3,100 ft.; Sept. 15, '09 (Dr. P. P. Calvert).

Type in the collection Acad. Nat. Sci. Phil.

Related to *R. (R.) illudens* Alexander (Bolivia)¹ but much smaller and dark brown in color, the thorax not clear gray with prominent pseudosutural foveæ. This is the most northerly representative of the subgenus yet made known.

Genus **GNOPHOMYIA** Osten Sacken.**Gnophomyia subhyalina** Alexander.

One female from Alajuela, C. R., alt., 3,100 ft., on Sept. 15, '09, by Dr. Calvert.

Genus **MOLOPHILUS** Curtis.**Molophilus orion**, new species.

Antennæ of the male moderately long; ventral appendage of the hypopygium in the shape of a long, paddle-like arm densely clothed with a brush of hairs on its inner face.

Male, length, 3.8 mm.; wing 4.4 mm.

Female, length, 4.4 mm.; wing 5 mm.

Male.—Rostrum and palpi brown; antennæ rather short, if bent backward not extending beyond the wing-root; the flagellar segments oval; antennæ brown covered with a dense pale pubescence; head grayish brown.

¹ Ent. News, 1914, Vol. XXV, pp. 210, 211; pl. 9, fig. 6.

Mesonotal præscutum grayish brown, the pseudosutural foveæ prominent, elongate, reddish brown; scutum, scutellum, postnotum and pleuræ grayish brown. Halteres rather long, uniform light yellow. Legs, coxæ and trochanters yellowish brown, femora and tibiæ similar, the tips of the individual segments not infuscated, tarsi brown. Wings rather uniform light yellow, the veins pale. Venation as in fig. 4.

Abdomen brown. Hypopygium about as in other species of the genus except the ventral appendage (see fig. 9) which here is long and slender, chitinized heavily, and having its inner or cephalic margin provided with a long dense brush of hairs. The anal lobe is provided with a dense covering of long pale hairs.

Female, similar but larger.

Holotype, male, Alajuela, C. R., alt. 3,100 ft., Sept. 15, '09 (Dr. P. P. Calvert).

Allotype, female, with the type.

Types in the collection Acad. Nat. Sci. Phil.

The numerous species of *Molophilus* bear a great superficial resemblance to one another and most of the species can only be separated by a comparative study of the male genitalia. The ventral apical appendage is heavily chitinized and very various in shape in the different species and offers the best criterion for specific determination. The only other Central American *Molophilus* described is *M. guatemalensis* Alexander¹ which I have figured in Entomological News, Vol. XXV, pl. 9, fig. 3, 1914; as shown by the figure, the ventral appendages of the two species are entirely different.

Genus **ERIOPTERA** Meigen.

Subgenus **Mesocyphona** Osten Sacken.

Erioptera (Mesocyphona) parva Osten Sacken.

Two males and two females from Alajuela, C. R., Sept. 15, '09.

Erioptera (Mesocyphona) caloptera femoranigra Alexander.

Many specimens of both sexes, including the type material, from Juan Vinas, C. R., July 21, '09; they were attracted to a light on a rainy evening. Also from Cache, C. R., near the Rio Reventazon alt. 3,450 ft., Mar. 4, '10, and at Alajuela, C. R., alt., 3,100 ft., Sept. 15, '09, one female specimen. Eleven specimens from the type locality now before me have the dark bands on the femora much paler and less intense, but undoubtedly belong here.

¹ Proc. U. S. Nat. Mus., Vol. 44, p. 511, 1913.

Genus **GONOMYIA** Meigen.Subgenus **Leiponeura** Skuse.**Gonomyia (Leiponeura) recurvata**, new species.

Pleuralis group; male hypopygium having two chitinized points on the pleurites; dorsal gonapophyses long, slender, almost straight; ventral gonapophyses bent cephalad.

Male, length, 4.4 mm.; wing, 3.7 mm.

Female, length, 5.7 mm.; wing, 5 mm.

Male.—Rostrum and palpi brown; antennæ with the basal segments yellow with a faint brown suffusion, flagellum brown; head pale yellowish.

Mesonotal præscutum light brownish orange, the lateral margin very pale yellow separated from the orange by a very narrow dark brown line which is not apparent in front; scutellum pale, whitish, with a brown median line. Pleuræ having the pale line that is enclosed by the pleural stripes very pale, almost white, the lower dark pleural stripe broad. Halteres light brown. Legs, coxæ and trochanters very pale, femora light brown with a broad, indistinct subapical ring, the tip rather broadly pale; tibiæ and tarsi light brown. Wings subhyaline, the stigmal spot vary large, rounded-oval, dark brown, veins brown.

Abdominal tergites light yellow, the extreme tip and base of each segment conspicuously dark brown; sternites more uniformly dark brown. Hypopygium with the pleural pieces rather stout, the dorsal fleshy appendage long, slender, very pale; the ventral appendage is enlarged at its base and near the tip bearing a prominent chitinized tooth which is directed outward; at the tip of the lobe are several bristles and before the chitinized portion there is a shorter conical tooth on the outer or caudal margin of the lobe, this tooth being very pale, subhyaline. The ventro-lateral margin of the pleurite is produced caudad into a long, slender chitinized rod which is directed toward the chitinized tooth described above. The dorsal gonapophyses (see Fig. 6, *e*): are very long, slender, straight, lying parallel to one another and diverging only at the tips which are more chitinized. The guard of the penis (*g*) is very long, slender, extending about to the point of divergence of the dorsal gonapophyses. The ventral gonapophyse (*f*) is rectangular with two short teeth at the tip. The whole organ is recurved cephalad and the tips lie against the flaring margin of the 9th sternite.

Female, similar to the male but larger, the yellow color of the abdominal tergites not so apparent.

Holotype, male, Alajuela, C. R.; alt. 3,100 ft.; Sept. 15, '09 (Dr. P. P. Calvert).

Allotype, female, near Cartago, C. R.; alt. 5,000 ft.; Dec. 15, '09; south slope of Irazu, over mud (Dr. P. P. Calvert).

Paratypes, male, with the holotype in the author's collection. Female, Laguna near Cartago; Feb. 26, '10.

Type in the collection Acad. Nat. Sci. Phil.

Gonomyia recurvata differs from its nearest described relatives, *amazona* Alexander and *pleuralis* Williston in the male hypopygium, the two chitinized appendages to the pleurites, the extremely elongate and straight dorsal gonapophyses and the remarkable recurved ventral gonapophyse.

Gonomyia (Leiponeura) calverti, new species.

Puella group; basal antennal segments tinged with brown; male hypopygium without a recurved ventral hook; ventral portion of the hypopygium with two rounded, flattened lobes each of which bear 8 or 9 chitinized teeth.

Male, length, 3.4 mm.

Male.—Rostrum and palpi brown; the enlarged basal segments of the antennæ brown, not orange, flagellum light brown.

Mesonotal præscutum very light grayish brown without distinct markings; the pronotum, a narrow lateral margin to the præscutum and the median line of the scutellum yellowish; scutum and postnotum light brown; scutellum yellow, more brown at the base. Pleuræ without distinct stripes. Halteres light brown, the knob yellow. Legs, light yellowish brown, the individual segments scarcely darkened at tip. Wings subhyaline with iridescent reflexions, veins brown, stigma lacking.

Abdomen light brownish yellow, the tergites rather darker than the sternites. Hypopygium having the pleural pieces (fig. 7) long, slender, slightly curved, clothed with sparse long hairs; the tip is suddenly narrowed, more chitinized and ending in two long curved bristles. Ventrad of the pleurites is an enlarged cylindrical tube which is produced dorsally into a long obtuse point, and ventrally into two hand-like flattened organs armed with 8 or 9 chitinized teeth as shown in fig. 8, *d*; these flattened organs are directed ventrad and entad. From inside this genital chamber, near the dorsal wall project two subchitinized elongate flattened appendages (*c*).

Holotype, male, Alajuela, C. R.; alt. 3,100 ft.; Sept. 15, '09 (Dr. P. P. Calvert).

Type in the collection Acad. Nat. Sci. Phil.

This species is similar to *puella* Williston in its pleural and wing patterns but the basal segments of the antennæ are suffused with brown and the hypopygium is very different from that shown in Williston's figure¹ which shows a prominent recurved ventral hook.

Tribe LIMNOPHILINI.

Genus **LIMNOPHILA** Macquart.

Limnophila guttulatissima Alexander.

One female from Cartago, C. R., along a ditch on Feb. 26, 1910.

¹ Trans. Ent. Soc. Lond., 1896, pp. 288, 289, pl. 10, fig. 60 *a*.

Tribe HEXATOMINI.

Genus **ERIOCERA** Macquart.**Eriocera exquisita** new species.

Wings uniform dark brown; color entirely reddish orange except the mesonotum which is dark brown; no black on abdomen.

Male, length, 11.6–13 mm.; wing, 11.5–12.4 mm.

Male.—Rostrum reddish brown; palpi short, basal segment orange, tip brown; first segment of the antennæ orange, second segment light reddish brown; flagellum dark brown; head orange, the frontal tubercle small, scarcely notched in front.

Pronotum light yellowish orange. Mesonotal præscutum dark chestnut brown on the sides, the middle line broadly paler, brightest, almost orange, in front, indistinctly divided by a median line; scutum dark brown; scutellum and postnotum yellowish orange. Pleuræ light orange yellow. Halteres black. Legs, coxæ yellow, trochanters, femora, tibiæ and tarsi brown. Wings uniform dark brown, veins brown. Venation as in fig. 5.

Holotype, male, Alajuela, C. R.; alt. 3,100 ft.; Sept. 9, '09 (Dr. P. P. Calvert).

Paratypes, 2 males, with the type.

Type in the collection Acad. Nat. Sci. Phil.; one paratype in the author's collection.

Subfamily TIPULINÆ.

Tribe DOLICHOPEZINI.

Genus **BRACHYPREMNNA** Osten Sacken.**Brachypremna dispellens** Walker.

One male from Bonnefil farm, Rio Surubres, C. R.; alt. 700 ft.; Oct. 19, '09 (Dr. P. P. Calvert).

Tribe TIPULINI.

Genus **TIPULA** Linnæus.**Tipula obliquefasciata** Macquart.

One female from Cachi, C. R.; Mar. 8, '10.

EXPLANATION OF PLATE 2.

Fig. 1. Wing of *Rhipidia* (*Conorhipidia*) *punctipennis* n. sp.

Fig. 2. Wing of *R. (Rhipidia) costalis* Williston.

Fig. 3. Wing of *Rhabdomastix* (*Rhabdomastix*) *septentrionalis* n. sp.

Fig. 4. Wing of *Molophilus orion* n. sp.

Fig. 5. Wing of *Eriocera exquisita* n. sp.

Fig. 6. Hypopygium of *Gonomyia (Leiponeura) recurvata* n. sp. Ventral aspect; *a*, pleural pieces; *b*, dorsal apical appendage; *c*, ventral apical appendage; *d*, intermediate apical appendage; *e*, dorsal gonapophyse; *f*, ventral gonapophyse; *g*, penis-guard.

Fig. 7. Hypopygium of *G. (L.) calverti* n. sp. Dorsal aspect of the pleurite.

Fig. 8. Same as last. Lateral aspect of the end of the abdomen. *a*, pleurites from the side; *b*, dorsal wall of the genital chamber; *c*, gonapophyse; *d*, ventral arms.

Fig. 9. Hypopygium of *Molophilus orion* n. sp. Ventral aspect of the ventral apical appendage.

Fig. 10. Thorax of *Rhipidia (Conorhipidia) punctipennis* n. sp. Lateral aspect showing the conspicuous dorsal protuberance.

DESCRIPTIONS OF GALL MIDGES.

By E. P. FELT,

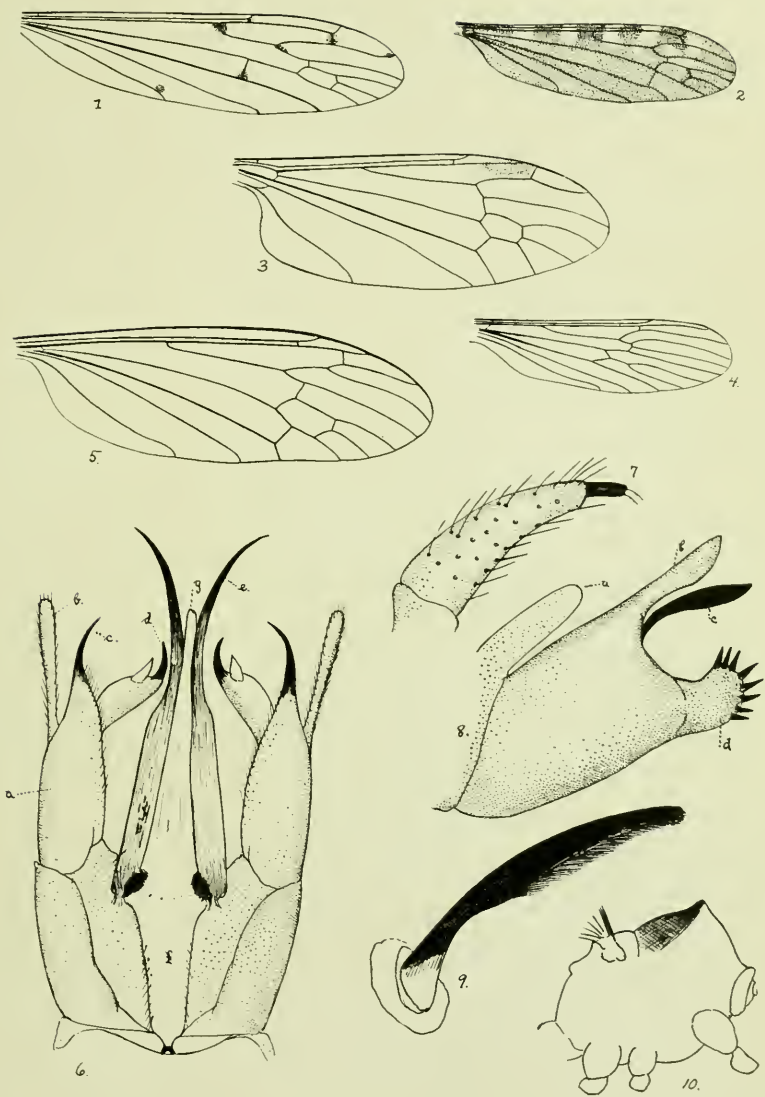
ALBANY N. Y.

The following descriptions of species are mostly based upon a remarkable collection made by Mr. C. P. Alexander in Fulton County, N. Y. Mr. Alexander succeeded in taking both sexes of the striking *Didactylomyia longimana* Felt, the female being previously unknown, and also obtained a series of the peculiar *Karschomyia viburni* Felt, the female of which had not been recognized before.

Colpodia americana new species.

This species is described from a male taken by Mr. C. P. Alexander August 14, 1909, on the east shore of Woodworth's Lake in the Adirondacks, altitude 1,550 feet. This form is related to *C. trifolii* Felt. It is larger in size, differs in coloration and exhibits a marked divergence in the structure of the genitalia.

Male.—Length 1.2 mm. Antennæ more than twice the length of the body, sparsely haired, fuscous yellowish; sixteen segments, the fifth with a stem twice the length of the basal enlargement, which latter has a length one-half greater than its diameter. Palpi; first segment with a length about four times its diameter, the second as long as the first, stouter, the third a little longer than the second, the fourth one-half longer than the third, more slender. Mesonotum light brownish yellow. Scutellum and postscutellum whitish yellow. Abdomen fuscous yellowish, the apex recurved dorsally. Halteres and



Costa Rican Tipulidae.

coxae pale yellowish, the legs light straw, except the somewhat lighter midtarsi and the nearly white posterior tarsi; claws slender, evenly curved, simple, the pulvilli shorter than the claws. Genitalia; basal clasp segment short, stout; terminal clasp segment short, the basal three-fourths greatly swollen, subglobose, the distal fourth produced as a relatively slender spur; dorsal plate long, broad, deeply and triangularly emarginate, the lobes broadly rounded and thickly setose; ventral plate long, broad, deeply and triangularly emarginate, the lobes narrowly rounded, setose. Harpes slender, heavily chitimized, simple, the distal fourth curved at nearly a right angle. Type Cecid. 1478.

Colpodia capitata new species.

The peculiar male was taken August 19, 1909, by Mr. C. P. Alexander at Woodworth's Lake in the Adirondacks, altitude 1,550 feet. This species is allied to *C. carolinæ* Felt, though easily separated by the longer basal enlargement of the flagellate antennal segments and the peculiar genitalia.

Male.—Length 1 mm. Antennæ probably twice the length of the body, sparsely haired, light brown, presumably sixteen segments; the fifth with a stem two and one-half times the length of the basal enlargement, which latter has a length two and one-fourth times its diameter. Palpi; first segment with a length about five times its diameter, the second as long as the first, stouter, the third a little longer than the second, more slender, the fourth one-fourth longer than the third. Mesonotum reddish brown. Scutellum and postscutellum yellowish. Abdomen light brownish yellow. Legs a nearly uniform light straw. Genitalia; basal clasp segment short, stout; terminal clasp segment short, greatly dilated and irregularly and obliquely truncate apically; dorsal plate broad, deeply and triangularly emarginate, the lobes broadly rounded and thickly setose; ventral plate long, broad, broadly and roundly emarginate, the lobes narrowly rounded. Harpes heavily chitimized, slender, irregularly furcate apically. A median organ, probably style, slender, heavily chitimized and apically apparently with a pair of heavy, curved clasping spurs. Type Cecid. 1480.

Colpodia ovata new species.

The male was taken by Mr. C. P. Alexander August 24, 1909, in a quarry at Woodsworth's Lake in the Adirondacks, altitude 1,540 feet. It is related to *C. diervilla* Felt from which it is readily separated by color characters and the length of the basal enlargement of the flagellate antennal segments.

Male.—Length 1.75 mm. Antennæ nearly twice the length of the body, rather thickly haired, light brown; sixteen segments, the fifth with a stem nearly two and one-half times the length of the cylindric basal enlargement, which latter has a length twice its diameter; terminal segment reduced, with a length three times its diameter and tapering gradually to an obtuse apex.

Palpi; second segment with a length about three times its diameter, the third a little longer than the second, more slender, the fourth irregular and apparently twice the length of the third. Mesonotum shining dark brown. Scutellum yellowish white, postscutellum yellowish orange. Abdomen dark yellowish brown, the margins lighter; genitalia darker. Halteres whitish transparent, slightly fuscous apically. Coxæ yellowish transparent, femora, tibiæ and basal tarsal segment dark straw, the distal half of the third, the fourth and the fifth tarsal segments yellowish white. Genitalia; basal clasp segment short, very broad, terminal clasp segment short, greatly swollen, subglobose and with a stout apical tooth; dorsal plate long, deeply and triangularly emarginate, the lobes roundly truncate; ventral plate indistinct. Harpes slender, heavily chitinated, decurved. Type Cecid. 1496.

***Colpodia porrecta* new species.**

The midge was collected August 21, 1909, by Mr. C. P. Alexander at Woodworth's Lake in the Adirondacks, altitude 1,570 feet. It is easily distinguished from other females by the unusually long stems of the flagellate antennal segments.

Female.—Length 2.75 mm. Antennæ nearly as long as the body, sparsely haired, fuscous yellowish, 13 segments, the fifth with a stem as long as the cylindric basal enlargement, which latter has a length about four times its diameter; terminal segment reduced, with a length three times its diameter, at the distal third tapering to an acute apex. Palpi; second segment with a length about three times its diameter the third one-half longer, more slender, the fourth one-half longer than the third. Mesonotum reddish brown, the submedian lines yellowish. Scutellum and postscutellum yellowish. Abdomen brownish yellow. Halteres yellowish basally, fuscous apically. Coxæ yellowish, femora, tibiæ, the first tarsal segment and the base of the second fuscous straw, the remainder of the tarsi yellowish or yellowish white. Ovipositor short, the lobes biarticulate, the terminal segment broadly oval and thickly setose. Type Cecid. 1484.

***Colpodia sylvestris* new species.**

The female described below was taken on a fern August 13, 1909, by Mr. C. P. Alexander at Woodworth's Lake in the Adirondacks, the altitude being 1,550 feet. This species is allied to *C. temeritatis* Felt, though easily distinguished by its larger size and different coloration.

Female.—Length 3 mm. Antennæ nearly as long as the body, sparsely haired, the basal three segments yellowish white, the others light brown; twelve segments, the fifth with a stem three-fourths the length of the cylindric basal enlargement, which latter has a length four times its diameter; terminal segment produced, with a length nearly six times its diameter. Palpi; first segment irregular, second with a length four times its diameter, the third as

long as the second, slightly stouter, the fourth one-half longer than the third. Thorax reddish yellow, the scutellum and abdomen mostly pale yellowish. Halteres, coxæ and posterior femora and tibiæ mostly pale yellowish; the anterior and mid-femora, tibiæ and tarsi fuscous straw, the posterior tarsi light straw. Ovipositor short, the terminal lobe narrowly oval, thickly and coarsely setose. Type Cecid. 1477.

***Didactylomyia longimana* Felt.**

A single example of this striking male was first taken at Auburn-dale, Mass., August 16, 1906, by Mr. C. W. Johnson. Several specimens of both sexes were collected by Mr. C. P. Alexander in August, 1909, at Woodworth's Lake in the Adirondacks, altitude about 1,500 feet. The female had not been recognized before.

Female.—Length 1.6 mm. Antennæ extending to the sixth abdominal segment, sparsely haired, yellowish basally, the distal two-thirds fuscous; fifteen subsessile segments, the fifth with a length fully three and one-half times its diameter, the distal segment produced, the basal enlargement with a length thrice its diameter and apically a moderately stout, fingerlike process. Palpi; the first segment subquadrate, the second with a length three and one-half times its diameter, the third shorter than the second, slender, the fourth one-half longer than the third and somewhat dilated. Thorax mostly yellowish orange. Scutellum yellowish white. Abdomen yellowish orange. Wings and halteres distinctly tinged with yellow. Coxæ yellowish, the anterior legs mostly fuscous, the posterior femora and tibiæ yellowish, the posterior tarsi nearly black; claws slender, strongly curved, unidentate, the pulvilli nearly as long as the claws. Ovipositor short, the lobes biarticulate, the terminal segment narrowly oval, coarsely setose. Described from a female captured with males. C. 1481.

***Asynapta apicalis* new species.**

The male of this species was taken August 24, 1909, by Mr. C. P. Alexander in a quarry at Woodworth's Lake in the Adirondacks at an elevation of 1,540 feet. It is related to *A. furcata* Felt from which it is readily separated by the longer stems of the flagellate antennal segments and the peculiar genitalia.

Male.—Length 2.75 mm. Antennæ one-half longer than the body, thickly haired, light brown; sixteen segments, the fifth with a stem two and one-half times the length of the basal enlargement, which latter has a length one-half greater than its diameter. Palpi; first segment slender, with a length thrice its diameter, the second as long as the first, stouter, the third one-half longer than the second, more slender and the fourth one-half longer than the third, slightly capitate. Mesonotum yellowish brown. Scutellum and postscutellum fuscous yellowish. Abdomen mostly yellowish brown. Halteres and coxæ yellowish transparent. Legs a nearly uniform light straw, except the two

distal tarsal segments which are whitish. Genitalia; basal clasp segment short, stout; terminal clasp segment long, irregularly oval, the spur subapical; dorsal plate long, deeply and triangularly emarginate, the lobes broadly rounded and thickly setose; ventral plate short, deeply and narrowly emarginate, the lobes slender, tapering, narrowly rounded. Harpes heavily chitinated, irregular and reflexed. Type Cecid. 1492.

***Asynapta mediana* new species.**

This species is described from a male taken August 24, 1909, by Mr. C. P. Alexander in a quarry at Woodworth's Lake in the Adirondacks, altitude 1,540 feet. It is allied to *A. apicalis* from which it may be readily separated by the longer basal enlargement of the antennal segments and the occurrence of the spur near the basal half of the terminal clasp segment.

Male.—Length 2.5 mm. Antennæ one-fourth longer than the body, thickly haired, light brown; sixteen segments, the fifth with a stem two and one-half times the length of the basal enlargement, which latter has a length twice its diameter; terminal segment produced, with a length about four times its diameter and tapering to a slender, irregular apex. Palpi; first segment with a length about four times its diameter, the second as long as the first, stouter, the third a little longer than the second, the fourth one-half longer than the third, strongly compressed. Mesonotum reddish brown. Scutellum and post-scutellum yellowish. Abdomen fuscous yellowish. Halteres yellowish basally, fuscous apically. Coxæ and femora basally pale yellowish, basal portion of femora, tibiæ and tarsi dark straw, except the two distal tarsal segments, which latter are yellowish white; claws moderately stout, strongly curved, simple, the pulvilli rudimentary. Genitalia; basal clasp segment short, stout; terminal clasp segment long, stout, narrowly oval, the spur near the basal half; dorsal plate long, deeply and broadly emarginate, the lobes obliquely truncate and sparsely setose; ventral plate indistinct. Harpes short, stout, recurved; the ventral margin finely dentate. Type Cecid. 1495.

***Asynapta umbra* new species.**

The midge was collected by Mr. C. P. Alexander in Johnstown Cemetery, August 6, 1909. It is related to *A. flavida* Felt from which it may be easily separated by its darker color and particularly by the shorter, thicker antennal segments.

Male.—Length 1.5 mm. Antennæ nearly as long as the body, sparsely haired, dark brown; seventeen segments, the fifth with a stem one-half the length of the cylindric basal enlargement, which latter has a length only one-fourth greater than its diameter and bears a very thick whorl of long, slender hairs; terminal segment produced, with a length nearly three times its diameter and tapering slightly to a narrowly rounded apex. Palpi; first segment irregular, second broad, with a length three times its diameter, the third a

little longer and more slender than the second, the fourth as long as the third, more slender. Mesonotum shining, very dark brown. Scutellum, and post-scutellum dark yellowish brown. Abdomen sparsely haired, fuscous yellowish, the genitalia darker. Halteres whitish transparent. Coxæ and legs a somewhat variable whitish yellow; claws stout, evenly curved, unidentate, the pulvilli as long as the claws. Genitalia; basal clasp segment short, stout; terminal clasp segment very short, greatly swollen, irregularly oval; dorsal plate long, deeply and triangularly emarginate, the lobes broadly rounded; ventral plate shorter, triangularly emarginate, the lobes obliquely truncate. Harpes slender, chitinized, recurved. Type Cecid. 1499.

Porricondyla setosa new species.

This midge was taken August 21, 1909, by Mr. C. P. Alexander in a bog swamp at Woodworth's Lake in the Adirondacks, altitude 1,570 feet. It is related to *P. caudata* Felt from which it is readily separated by color characters and especially by the shape of the terminal lobe of the ovipositor.

Female.—Length 1.75 mm. Antennæ nearly as long as the body, thickly haired, light brown; thirteen segments, the fifth with a stem one-fourth the length of the cylindric basal enlargement, which latter has a length about four times its diameter; terminal segment reduced, slender, fusiform, with a length about three times its diameter. Palpi; first segment with a length four times its diameter, the second a little stouter, the third a little longer and more slender than the second, the fourth one-half longer and more slender than the third. Mesonotum shining brownish black. Scutellum and postscutellum fuscous yellowish. Abdomen rather thickly haired, dark brown. Halteres yellowish basally, fuscous apically. Coxæ yellowish, femora, tibiæ and tarsi fuscous straw, the fourth and the basal portion of the fifth tarsal segments white. Ovipositor short, the terminal lobes lanceolate and thickly setose. Type Cecid. 1487.

Janetiella parma new species.

This yellowish midge was taken by Mr. C. P. Alexander. August 21, 1909, in a bog swamp at Woodworth's Lake in the Adirondacks, altitude 1,570 ft. It is easily separated from allied forms by the greatly produced antennal segments.

Male.—Length 1 mm. Antennæ probably twice the length of the body, light brown, presumably sixteen segments; the fifth with a stem twice the length of the cylindric basal enlargement, which latter has a length three-fourths greater than its diameter. Palpi; first segment irregular, with a length three times its diameter, the second as long as the first, stouter, the third one-half longer than the second, slender, the fourth one-half longer than the third. Mesonotum reddish brown, the submedian lines yellowish orange. Scutellum, postscutellum and basal abdominal segments yellowish or yellowish orange,

the distal abdominal segments rather thickly haired, yellowish brown, the genitalia nearly fuscous. Halteres whitish basally, fuscous apically. Coxæ and the base of femora yellowish, the distal portion of femora, tibiæ and tarsi dark straw; claws slender, strongly curved, simple, the pulvilli half as long as the claws. Genitalia, basal clasp segment long, slender; terminal clasp segment long, slender, tapering; dorsal plate shell-like, broad, broadly and roundly emarginate, the emargination thickly setose; style long, slender, narrowly rounded apically; other structures obscure. Type Cecid 1488.

Toxomyia americana new species.

This species is described from a small midge collected collected by Mr. C. P. Alexander, August 21, 1909, in a bog swamp at Woodworth's Lake in the Adirondacks, altitude 1,570 feet. It is easily separated from the two known West Indian species recorded as living upon fungi, by the longer basal portion of the stem of the fifth antennal segment of the male and its darker color.

Male.—Length 1 mm. Antennæ nearly twice the length of the body, thickly haired, light brown; fourteen segments, the fifth having the stems with a length three and four and a half times their diameters, respectively; terminal segment produced, the basal portion of the stem with a length fully six times its diameter, the distal enlargement produced, irregular and with a long, stout, tapering process apically. Palpi; first segment short, irregular, the second with a length four times its diameter, the third a little longer than the second, more slender, the fourth one-fourth longer than the third, dilated. Mesonotum a variable reddish brown. Scutellum and postscutellum yellowish. Abdomen thickly haired, fuscous yellowish. Halteres, coxæ and femora mostly fuscous yellowish, the tibiæ and anterior and mid tarsi fuscous straw, the posterior tarsi lighter. Claws slender, strongly curved, the anterior unidentate, the pulvilli about half the length of the claws. Genitalia; basal clasp segment stout, with a longitudinal setose ridge near the middle; terminal clasp segment moderately long, stout; dorsal plate narrowly and uniformly emarginate, the lobes narrowly rounded, setose; ventral plate indistinct. Type Cecid. 1485.

Bremia borealis new species.

The midge was taken by Mr. C. P. Alexander, August 24, 1909, in a quarry at Woodworth's Lake in the Adirondacks, altitude 1,540 feet. It is easily distinguished from other species referable to this genus by the longer distal enlargement of the fifth antennal segment and the distinct subapical swelling of the terminal clasp segment.

Male.—Length 1.3 mm. Antennæ twice the length of the body, thickly haired, light brown; fourteen segments, the fifth with the stems one and one-half and three and one-half times their diameters, respectively, the distal enlargement with a length one-half greater than its diameter. Palpi; first segment subquadrate, the second irregular, with a length five times its diameter,

the third a little shorter than the second, the fourth one-half longer than the third. Mesonotum reddish brown. Scutellum and postscutellum yellowish brown. Abdomen thickly haired, dark yellowish brown. Halteres and coxæ pale yellowish, femora basally, the distal portion of femora, tibiæ and tarsi dark straw; claws strongly curved, the anterior unidentate, the pulvilli rudimentary. Genitalia; basal clasp segment stout, the terminal clasp segment long, swollen subapically; dorsal plate broad, very broadly and roundly emarginate; ventral plate long, slender, narrowly rounded. Type Cecid. 1497.

Bremia tristis new species.

This species is described from a male taken by Mr. C. P. Alexander, August 10, 1909, in a stone quarry at Woodworth's Lake in the Adirondacks, altitude 1,500 feet. It is allied to *B. podophyllæ* Felt from which it is most readily separated by the broadly and roundly emarginate dorsal plate.

Male.—Length 1.2 mm. Antennæ twice the length of the body, sparsely haired, light brown; fourteen segments, the fifth having the stems with a length three and four and a half times their diameters, respectively; terminal segment greatly produced, the basal portion of the stem with a length seven times its diameter, the distal enlargement irregular, narrowly pyriform and apically with a fingerlike process having a length six times its diameter. Palpi; first segment subquadrate, the second with a length three times its diameter, the third one-half longer, more slender, the fourth one-half longer than the third, more slender. Mesonotum reddish brown, the submedian lines, scutellum and postscutellum yellowish. Abdomen thickly haired, yellowish brown, darker apically. Genitalia yellowish. Halteres fuscous yellowish, fuscous apically. Coxæ and femora basally yellowish white, the distal portion of femora light brown; tibiæ and tarsi mostly dark brown; claws moderately stout, strongly curved, the anterior unidentate, pulvilli rudimentary. Genitalia; basal clasp segment stout; terminal clasp segment long, tapering uniformly; dorsal plate short, broad, very broadly and roundly emarginate, the lateral margins obliquely truncate; ventral plate indistinct. Type Cecid. 1475.

Bremia montana new species.

This midge was taken by Mr. C. P. Alexander, July 21, 1909, on *Impatiens* at Mountain Lake in the Adirondacks, altitude 1,590 feet. It is easily distinguished from other species of *Bremia* having the stems of the fifth antennal segment unequal, by the length of the basal portion.

Male.—Length 1.5 mm. Antennæ probably one-half longer than the body, thickly haired, dark brown; fourteen segments, the fifth having the stems with a length two and one-half and three and one-half times their diameters, respectively. Palpi; the first segment quadrate, with a length about twice its diameter, the second a little longer, stouter, the third a little longer than the

second, more slender and the fourth slightly longer than the third. Mesonotum reddish brown, the submedian lines thickly haired. Scutellum and postscutellum pale yellowish. Abdomen mostly yellowish brown, the second and third segments fuscous; pleuræ yellowish. Halteres yellowish basally, fuscous apically. Coxæ and femora basally yellowish, the distal portion of femora and tibiæ fuscous yellowish, the tarsi mostly fuscous. Genitalia; basal clasp segment moderately stout; terminal clasp segment long; dorsal plate deeply and triangularly emarginate, the lobes broadly and irregularly rounded; ventral plate long, broad, slightly dilated and broadly rounded apically. Type Cecid. 1336.

Thomasia californica new species.

The female described and tentatively referred to this genus, was reared August 27, 1913, from galls on *Symphoricarpos* collected by Prof. E. Bethel at Lake Tahoe, California, the last of July. This is the first American representative of the genus to be found.

Gall.—Length 1.5 cm., width 1 cm. This deformity consists of irregularly thickened, partly unfolded opposite leaflets, the swelling being confined mostly to the basal half of the midrib. The upper leaflets are usually affected and the central shoot arrested or destroyed as a result of the infestation.

Female.—Length 2.5 mm. Antennæ extending to the third abdominal segment, sparsely haired, fuscous yellowish; fourteen segments, the fifth with a short stem, scarcely one-fifth the length of the cylindric basal enlargement, which latter has a length two and one-half times its diameter; terminal segment slightly produced and tapering shortly to an obtuse apex. Palpi; first segment irregular, subquadrate, the second with a length fully three times its diameter, the third one-half longer than the second, more slender, the fourth as long as the third, somewhat dilated. Mesonotum yellowish brown. Scutellum and postscutellum yellowish. Abdomen yellowish salmon. Wings hyaline, the third vein uniting with costa just before the apex of the wing. Halteres, coxæ and femora pale yellowish; tibiæ and tarsi light straw; claws rather slender, strongly curved, unidentate, the pulvilli about half the length of the claws. Ovipositor as long as the body, the lobes narrowly oval and with a few coarse setæ. Type Cecid. a2438.

Karschomyia viburni Felt.

The striking male of this species, easily recognized by the trinodose antennae and the enlarged and peculiar genitalia, was taken in Washington Park, Albany, N. Y., June 1, 1906. Specimens have subsequently been received through Mr. Owen Bryant from Greylock Mountain, Mass., and also from Mr. C. P. Alexander who captured specimens of both sexes in August, 1909, in a bog swamp at Woodworth's Lake in the Adirondacks, altitude about 1,570 feet. Through his efforts we have been able to associate the female with the opposite sex.

Female.—Length 2 mm. Antennæ a little longer than the body, thickly haired, dark brown; fourteen segments, the fifth with a stem one-half the length of the cylindric basal enlargement, which latter has a length about three and one-half times its diameter and presents slight indications of three constrictions, especially in the basal flagellate segment, thus duplicating in a measure, the three nodosities in the flagellate antennal segments of the male. Palpi; first segment irregularly oval, second broad, with a length about three times its diameter, the third one-third longer than the second, slender, the fourth about as long as the third, slightly dilated. Mesonotum fuscous brown. Scutellum and postscutellum fuscous yellowish. Abdomen rather thickly haired, yellowish brown. Halteres and coxæ pale yellowish; legs otherwise a nearly uniform straw; claws stout, strongly curved, the anterior unidentate, the pulvilli about half the length of the claws. Ovipositor short, stout, with a length about one-fourth that of the abdomen, the terminal lobes tapering to a narrowly rounded, thickly setose apex. Near the posterior ventral angles of the dorsal sclerite there is a peculiar filamentous, circular, chitinous structure having a diameter about one-fifth the width of the basal portion of the ovipositor.

Described from females taken in association with the male, agreeing therewith structurally and presenting a marked similarity in appearance. Cecid 1490.

Hormomyia saturni new species.

The midge was taken August 24, 1909, by Mr. C. P. Alexander in the Adirondacks, altitude 1,540 feet. It appears to be related to *H. shawi* Felt from which it is easily separated by the darker abdomen and the distinctly longer stems of the flagellate antennal segments.

Male.—Length 3.5 mm. Antennæ probably as long as the body, thickly haired, yellowish or yellowish brown; probably fifteen segments, the fifth having the stems with a length one and one-half and two and one-half times their diameters, respectively, the circumfili being a little longer than in *H. americana* Felt. Palpi; the first segment broadly oval, the second greatly produced, slender, with a length about ten times its diameter. Mesonotum a variable yellowish brown, the submedian lines lighter. Scutellum reddish yellow, post-scutellum a little darker. Abdomen a somewhat variable fuscous yellowish. Genitalia yellowish. Halteres yellowish transparent, the coxæ, femora, tibiæ and first tarsal segment pale yellowish, the other tarsal segments lost. Genitalia; basal clasp segment stout; terminal clasp segment rather short, stout, not swollen, dorsal plate long, deeply and triangularly incised, the lobes narrowly rounded; ventral plate long, broad, broadly and roundly emarginate. Type Cecid. 1493.

Itonida uliginosa new species.

This yellowish midge was taken August 21, 1909, by Mr. C. P. Alexander in a bog swamp at Woodworth's Lake in the Adirondacks,

altitude 1,570 ft. It is allied to *I. apocyni* Felt and its related forms, from which it may be readily separated by the yellowish orange body and the structure of the genitalia.

Male.—Length 1 mm. Antennæ probably twice the length of the body, thickly haired, pale straw; fourteen segments, the fifth having the stems with a length three and one-half and four and one-half times their diameters, respectively; fourth palpal segment with a length one-half greater than the third. Body a somewhat variable yellowish or yellowish orange, the terminal clasp segment of the genitalia apparently tipped with fuscous. Wings yellowish. Halteres, coxæ and femora basally pale yellowish, the distal portion of femora, tibiæ and tarsi mostly yellowish straw, the latter possibly indistinctly banded; claws simple, the pulvilli rudimentary. Genitalia; basal clasp segment moderately stout; terminal clasp segment long; dorsal plate moderately long, broad, triangularly emarginate, the lobes roundly truncate, the lateral angles being slightly produced and sparsely setose; ventral plate long, broad, broadly and roundly emarginate, the lobes short, broad.

Female.—Length 2 mm. Antennæ as long as the body, sparsely haired, whitish basally, light brown apically; stems whitish transparent, the fifth with a stem three-fourths the length of the cylindric basal enlargement, which latter has a length two and one-half times its diameter. Palp†; the first segment with a length four times its diameter, the second a little longer, stouter, the third one-fourth longer than the second, more slender, the fourth one-half longer than the third, more slender. Body a uniform yellowish or yellowish orange. Wings, coxæ, halteres and femora basally yellowish, the distal portion of femora, tibiæ and tarsi light brownish. Ovipositor short, the terminal lobes broadly oval and thickly setose. Both sexes were taken together and are probably conspecific. Type Cecid. 1486.

BIOLOGICAL NOTES CONCERNING DROSOPHILA AMPELOPHILA.

BY FRANK E. LUTZ,

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This little fruit-fly has been of unusual importance in the recent study of evolution, especially of that phase of the study which deals with inheritance. Not only have cases of simple Mendelian characters been conveniently studied by its aid but more complex ones have been analyzed although some are not yet "explained." The work of Morgan and his pupils with it has demonstrated beyond a

doubt a relation between certain somatic characters and the sex chromosome. These "sex-linked" characters are not secondary sexual characters but it is probable that this fly may help us to an understanding of the latter since there seems to be a relation, possibly indirect, between the two.¹

The species also offers an excellent opportunity to study those problems which we, curiously enough, term "biological." In nature it feeds on all sorts of fermenting material and has been reared even from human excrement. In the laboratory the most convenient and satisfactory food is over-ripe banana. It is difficult to say just how many eggs are laid by each female but the average is probably two or three hundred. Fig. 491 in Packard's (1898) Text Book of Entomology shows the pair of filaments with which the eggs are provided. In oviposition the end of the egg bearing these is the last to leave the oviduct and they protrude from the fermenting mass in which the egg is usually laid, probably serving a respiratory function.

It sometimes happens that the egg hatches before it leaves the female. As this does not usually occur unless no suitable material in which to oviposit has been found it is improbable that any of the oviviparous offspring ever reach maturity. The longest period at normal temperatures required for hatching that I have observed is about fifty hours. The average is probably less than thirty. Such observations are difficult to make with large numbers and I have combined the egg and the larval stages in most of my work.

The larvæ usually feed near the surface of the fermenting mass. I have reared the fly for several generations in a glass of stale beer. In this case the larvæ were able to keep a position just under the surface film where it met the glass. The length of the larval period varies greatly according to temperature, food supply and other conditions. The accompanying table gives the result of an experiment involving about 4,000 flies fed on banana at a fairly constant temperature approximating 25° C. Pupation began four days after egg-laying and came on with a rush during the fifth and sixth days; then the number gradually dropped off until the four individuals which required eleven days. There is little or no sexual difference,

¹ Lutz, F. E., 1913, "Experiments Concerning the Sexual Difference in the Wing Length of *Drosophila ampelophila*," Journal of Experimental Zoölogy, XIV, pp. 267-273.

that which was found being in favor of the males having a shorter egg-larval life than the females but the difference was well within the probable error.

TABLE SHOWING THE NUMBER OF INDIVIDUALS COMPLETING THEIR EMBRYONIC PERIODS IN A GIVEN NUMBER OF DAYS.

Days.	Egg-Larval.	Pupal.
2		1
3		3
4	92	1,087
5	1,258	2,398
6	1,435	438
7	744	33
8	405	9
9	91	6
10	14	0
11	4	2
12		1

In order to pupate the larvæ crawl to the dryer portions of the food or even entirely out of it. If pupation occurs in the food the horns of the pupal case nevertheless protrude into the air. The table shows that at first the flies emerge in large numbers but that a few lag along taking more than twice the average time. A sexual difference is more pronounced in the pupal period than in the egg-larval. Among 262 offspring of a single pair the average pupal period of the sisters at 25° C. was 5.0 days and that of the brothers 5.3 days.

The sex ratio varies greatly in different families. Moenkhaus¹ found that among 26,933 individuals there were 1,126 females to each male, but in certain families it is occasionally two to one or even more. It does not change with the age of the parents. The details of the work done upon the modification and inheritance of the sex ratio are too complicated to be taken up here.

The newly emerged adults expand their wings as they walk about. In a few minutes they are ready to fly. In this they are almost absolute slaves to light, going in the direction of its greatest intensity.

¹ Moenkhaus, W. J., 1911, "The Effects of Inbreeding and Selection on the Fertility, Vigor and Sex Ratio of *Drosophila ampelophila*," Journal of Morphology, XXII, pp. 123-154.

However, acetic acid or fruit odors will overcome this reaction and they will go into dark places to get at their food. Payne¹ has found that even after these flies had been reared in darkness for sixty-nine generations they still reacted to light with nearly normal vigor. The reaction is slow among newly emerged flies but soon becomes more rapid, reaching a maximum in about eighteen hours, and then very gradually sinks as the flies age. My experience also indicates that the females react about twice as quickly and definitely as the males. Moenkhaus, on the other hand, found the males to be slightly more responsive than the females. Possibly the fact that the tube in his apparatus was inclined at an angle of twenty-five degrees explains the difference since it introduces the reaction against gravity.

Both males and females become sexually active the second day after emerging. There is usually a sort of courtship dance before mating in which the male or males go from side to side and around the female, flitting their wings and attempting to crawl on her back. Unless the female be an old one which has not recently mated this courting is usually kept up for from several minutes to an hour or more, the female preventing mating by curling the tip of her abdomen downwards and keeping her wings together. The duration of actual copulation is also variable. It averages about half an hour but may continue for an hour and a half. A vigorous male will mate repeatedly during a single day and occasionally the same is true of the females. It seems to be necessary for the female to mate several times during a normal life or the late developed eggs will not be fertile.

Apparently inbreeding is not detrimental. Castle and his co-workers² have found that, if it does reduce productiveness, fertility may be maintained nevertheless by selection. Sterility is not rare in wild material. Thus among twenty-five random matings of wild flies I found two to be sterile. Neither does inbreeding seem to be

¹ Payne, F., 1911, "*Drosophila ampelophila* Loew Bred in the Dark for Sixty-nine Generations," Biological Bulletin, XXI, pp. 297-301.

² Castle, W. E., Carpenter, F. W., Clark, A. H., Mast, S. O., and Barrows, W. M., 1906, "The Effects of Inbreeding, Cross-breeding and Selection upon the fertility and variability of *Drosophila*," Proc. Amer. Acad. of Arts and Sciences, XLI, pp. 731-786.

accompanied by degeneration of external parts even when accompanied by disuse.¹

The normal length of adult life, like all similar characters, is largely dependent upon environment. Moenkhaus states that they kept females alive for 153 days but does not say what the conditions were. Among 267 females which I kept well supplied with food at room temperatures but isolated from males, only one lived to be 80 days old. The average age at death was 26.4 days. The longest lived, unmated male under the same conditions died in 90 days, the average being 32.8 days.

Another series of unmated flies (116 males and 124 females) were kept at a relatively constant temperature of 20° C. and furnished water but no food. Three females and one male lived 96 hours. The average age at death was 68.6 hours for the females and 66.4 for the males. In another series in which the conditions were the same except that the temperature was five degrees higher, the females withstood starvation for only 60.7 hours, on the average, and the males 55.6 hours. In still another series the temperature was 20° C. but, in addition to withholding food, no water was supplied except that evaporating from their own bodies. The average females lived 56 hours and the average males 53.5 hours. It is difficult to say why the females can withstand starvation better than the males but have a shorter natural life, at least when unmated.

The materials which kept these starved individuals alive were all laid up by the feeding larvæ for no food was supplied after the fly emerged and, of course, the pupæ did not feed. I was surprised, therefore, to find that those which were better able to withstand starvation in the adult stage had had a shorter larval period, and fed for a shorter time, than the others. The data for this are still being worked up and will be published later but the explanation probably is that the physiologically strong larvæ were able to complete their larval history quickly and gave rise to physiologically strong adults.

¹ Lutz, F. E., 1911, "Experiments with *Drosophila ampelophila* Concerning Evolution," Carnegie Institution of Washington, Publication No. 143.

NOTES ON THE SPECIES OF SCAPHINOTUS DEJEAN INHABITING NORTHEASTERN AMERICA WITH DESCRIPTION OF A NEW SPECIES.

BY CHARLES W. LENG,

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The tendency of the barrier created by the Allegheny Mountains to separate distinct though closely related species in the tribe Cychnini has already been exemplified in the final separation of *Cychnus germari* and *andrewsi* by Roeschke, and *Cychnus indianæ* and *stenotomus* by Blatchley; a further example of the influence of the same barrier will be found in the variations of *Scaphinotus elevatus*, and in the necessity of separating the eastern and western races of the species heretofore known as *Cychnus* or *Scaphinotus unicolor*.

Scaphinotus was founded by Dejean for *Cychnus elevatus* and *unicolor* and contains those species in which the hind angles of the thorax are so dilated as to project over the base of the elytra. Authors have not agreed as to its standing and in our Check List, based upon Dr. Geo. H. Horn's review of the genus,¹ it is treated as a synonym, but in Dr. Roeschke's paper² the latest and most complete study, embracing the Cychnini of the world, it receives recognition.

The specific names that have been proposed, arranged chronologically, are as follows:

elevatus Fabricius, 1787, Mant. Ins., I, p. 198.

unicolor Fabricius, 1787, Mant. Ins., I, p. 198.

heros Harris, 1839, Bost. Journ., II, p. 196.

flammeus Haldeman, 1844, Proc. Ac. Nat. Sci. Phila., II, p. 54.

dilatatus Leconte, 1853, Trans. Am. Phil. Soc., X, p. 398.

tenebricosus Roeschke, 1907, Mon. p. 141.

besides a number of names for species occurring in Colorado, New Mexico and Arizona that are not within the scope of the present paper.

Of the eastern species *S. elevatus* is by far the best known and the most widely distributed. It is distinguished by its size, 15-23

¹ Trans. Am. Ent. Soc., VII, 1878.

² "Monographie des Carabiden-Tribus Cychnini," Annales Musei Nationalis Hungarici, 1907.

mm., by the slight flattening of the disk of the elytra, the presence of the seta of the posterior coxa, and by the first joint of the male anterior tarsi being spongy pubescent over at least half its under surface.

The range of *S. elevatus* is greatly extended, from Massachusetts to Florida on the Atlantic coast and inland to Missouri and Nebraska, but it varies in many respects and has been subdivided into several subspecies. In the northern Atlantic states one finds the typical *elevatus* with moderately elevated thoracic margins and cupreous elytra; along the coast, especially from Virginia southward, one finds darker colored specimens in which the margins of the thorax are more reflexed and approximated, making the insect look narrower. An extreme example of this tendency was taken by Mr. Geo. P. Engelhardt in the Dismal Swamp, Virginia. The name *unicolor* was formerly applied to this dark narrow form, but erroneously, and Dr. Roeschke has called it *tenebricosus*¹ defining the subspecies as follows: "Completely black or with feeble violet tinge; narrow, compressed form; sides of thorax very broad and greatly elevated with very sharp hind angles, or even pointed wings, which project far over the elytra; disk of thorax dull, simply granulate, not or scarcely punctured." It will be seen that most of the darker specimens approach rather than comply completely with this definition.

Across the Allegheny Mts., *S. elevatus* varies similarly in color, but whatever the color, the variation in form takes an opposite direction, the hind angles being flattened down and broader, the whole insect shorter, broader and flatter. The first name applied to this form was *flammeus* by Haldeman, the type coming from Marietta, Ohio, on the Ohio River, and opposite West Virginia. The description is short "Elytra pale brilliant violet, distinguished from *elevatus* by the wider prothorax and elytra and lighter color; profile flatter above when viewed laterally." The color described is unusual and led Dr. Leconte to redescribe the more usual form from the western states. The actual description appeared in 1848² under the name *flammeus* and *dilatatus* was substituted in 1853³ when Dr. Leconte discovered that his insect and Haldeman's were not identical. The

¹ Mon., p. 141.

² Ann. Lyc. Nat. Hist. N. Y., IV, p. 440.

³ Trans. Am. Phil. Soc., X, p. 398.

type locality for *dilatatus* is St. Louis, Mo., and the long description calls for a dark violet insect with coppery elytra, much wider than *elevatus* with the sides of thorax less elevated, exactly as shown in a number of specimens taken by Mr. H. G. Barber at Langdon, Mo. Dr. Roeschke treats *dilatatus* as a synonym of *flammeus* but it would be more cognizant of the described color of the elytra to consider it a variety.

Whether it be called simply *flammeus* or *flammeus* var. *dilatatus*, it will be seen that the form occurring west of the Allegheny Mts. differs sufficiently from that occurring east of the mountains to have required a name in the opinion of Haldeman, Leconte and Roeschke.

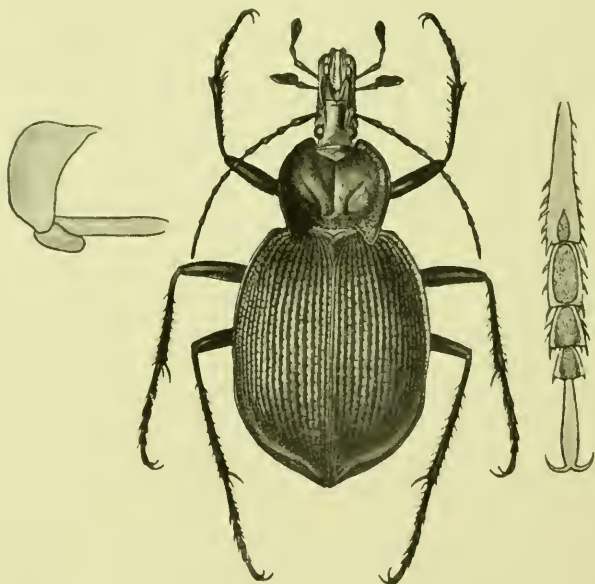
Coming now to the other species *S. unicolor* of which *heros* has been treated as a synonym, it is singular that though it also occurs on both sides of the Alleghenies, no such differentiation has hitherto been made. It differs from *elevatus* by its size (25-30 mm.), by the continuously arched elytra, the curve reaching from margin to margin without any flattening of the disk, by the seta of the posterior coxa being absent, and the first joint of the anterior male tarsi spongy pubescent at the tip only. These characters separate *unicolor* and its subspecies from *elevatus* and its subspecies; but, in addition it, like *elevatus*, possesses characters which vary, and these variations are similarly correlated with its distribution.

The greatest difficulty has long been that the sinuation of the lateral margin of the elytra a little behind the middle, first pointed out by Louis H. Joutel as the most obvious difference between this species and *elevatus*, and plainly evident in all the specimens I had seen, was not shown in the figure of *unicolor* or mentioned in the descriptions. Moreover, if one were willing to accept *heros* Harris as a synonym of *unicolor*, this difficulty became increased for the very careful description of Dr. Harris and the figure of *heros* given by Leconte in 1853¹ also failed to indicate this sinuation. During the lifetime of the late Frederick Blanchard, I took this point up by correspondence with him and he examined the Leconte collection and his own and wrote me "the lateral sinuation of the elytra is feeble or quite obsolete in most specimens." Either the species was variable in this respect or my observation and that of Joutel and others was at fault; or our eastern specimens were neither *heros* nor *unicolor*.

¹ Journ. Ac., IV, pl. 4, fig. 13.

Lately this difficulty has been dispersed by a comparison of the localities for the specimens which lack the lateral sinuation of the elytra, viz.: Ohio, Indiana, Kentucky, Tennessee, all west of the Allegheny Mts., with the type locality for *heros* given by Dr. Harris, "Ohio and Indiana," for it became plain that the specimens from the west, that are without the lateral sinuation, were the true *heros* and differed specifically from those from Washington, D. C., in which the lateral sinuation of the elytra is always well developed. Showing the material to Mr. Wm. T. Davis, he at once detected a further difference in the form of the thorax so I propose to add one more name to our list, dedicating it to the collector who has taken and distributed the largest number, by calling it *Scaphinotus shoemakeri* new sub-species.

This sub-species resembles *S. heros* but differs especially in the



greater approximation of the hind angles of the thorax which are separated in *heros* by 7 mm. making the sides of the thorax nearly parallel, while in *shoemakeri* the much higher and more reflexed hind angles approach each other within 5 mm., making the sides of the thorax somewhat convergent; as well as in the lateral sinuation of

the elytral margin mentioned above. The complete description is as follows:

Scaphinotus shoemakeri new subspecies.

Black, with a dark violet shade, elytra violet; ovate, margin of thorax strongly reflexed, hind angles extending over the elytra, disk in part coarsely punctured; elytra with punctured striæ, humeral angles rounded, with the margin elevated, lateral margin becoming gradually less elevated towards apex, interrupted behind the middle by a shallow emargination, as if to make a recess for hind femora. Head black, rim punctured, feebly wrinkled behind the eyes with an acute carina, strongly elevated at base of antennæ; thorax black, tinged with violet, coarsely punctured at apex, base and in the angles formed by the reflexed margins, which are strongly elevated so that the hind angles are separated by but five millimeters, while the thorax at its widest portion measures eight millimeters; the edge is only moderately thickened; elytra ovate, short, slightly but continuously convex, violet, deeply striate, the 15 or 16 striæ strongly punctured, towards tip and behind the subapical umbone the striæ become obsolete and the punctuation confused; the lateral margin is strongly elevated at humeri and gradually descends in height, becoming almost obsolete at apex; a little behind the middle it is interrupted by a sinuation. Beneath black, the inflexed portion of elytra coarsely punctate, the body beneath feebly punctulate, thorax and abdomen impunctate.

Male.—Tip of first tarsal joint, and all second, third and fourth joints spongy pubescent beneath; last ventral segment transversely concave, feebly wrinkled and with three setigerous punctures on each side of apex. Length, 25-30 mm. Width, 13-15 mm.

This subspecies probably inhabits many suitable localities east of the Allegheny Mts. The type and about fifty more specimens I have seen come from Washington, D. C., and its vicinity in Virginia and Maryland collected by Mr. Shoemaker and Mr. Davis. Mr. Shoemaker tells me the largest number were taken in Virginia under stones, logs and leaves or in bait bottles along the Potomac River above the free bridge, along the path or beside it and especially under stones about a spring. The path passes through dense woods near the foot of a steep hill. Fewer were taken in Maryland, along the bank of the stream above the Cabin John Bridge, and a few have also been taken along Rock Creek and in Rock Creek Park in the District of Columbia. The localities are all heavily wooded and abounding in snails. The dates of capture are principally September but specimens have also been found in June and August. The figure has been drawn from the male by Ernest Shoemaker; it represents the insect twice life size and the underside of the anterior tarsus still more enlarged as well as the posterior coxa.

As to the synonymy of *S. unicolor* Fab. and *S. heros* Harris, first announced by Dr. Leconte, a few words may be added. The type of *unicolor* is said to be in Glasgow, where it was last examined by Schaum,¹ who endorsed Dr. Leconte's opinion that the two were synonymous, but only states that *unicolor* is a splendid big *Scaphi-notus*. Olivier figures² *unicolor*, the figure representing, according to Roeschke, a female of 29 mm. length, which in respect of size agrees with *heros*. This figure also agrees with *heros* in the form of the thorax and in the absence of lateral sinuation of elytral margin; but *heros* being apparently confined to the region west of the Allegheny Mts., one cannot accept the synonymy of *unicolor* and *heros* without assuming that the Fabrician type came in 1787 from a region then populated by Indians and scarcely ever visited by white men. It seems more probable that the type of *unicolor* came from the Southern Atlantic states, whence most of the early American material was sent to Europe. For a time the name *unicolor* was used for the large dark variety of *elevatus* found in the southern states, and a reëxamination of the type may revive that view, which was indeed first suggested by Fabricius himself. The weight of authority, however, Schaum, Leconte, Roeschke, and the measurement indicated by Olivier's figure, support the accepted synonymy; and since *shoemakeri* cannot be reconciled with the description and figure and *heros* comes from too improbable a locality I prefer to cite *unicolor* as the species and *shoemakeri* and *heros* as subspecies, separated structurally and geographically as stated. The status of *unicolor* must, in spite of the authorities, remain doubtful until the type can be reëxamined and compared with *shoemakeri*; but in any event the name *heros*, proposed by Dr. Harris for the Ohio and Indiana form, must be revived as a species, if *unicolor* proves to be a race of *elevatus*, or as a subspecies if the type of *unicolor* proves to be possessed of the characters ascribed to that species.

¹ Stett, *Ent. Ztg.*, 1848, p. 335.

² Ent., III, No. 35, pl. 6, fig. 62.

LEPIDOPTEROUS LARVÆ FROM RAPID STREAMS.¹

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The aquatic lepidopterous larvæ hitherto known are all inhabitants of quiet waters,—lakes, ponds or pools. Herewith are described three species of *Elophila* inhabiting swift waters, one species from N. Y. state and two from Colombia, S. A. In several ways they are unique. They are found in very swift flowing water where one finds the larvæ of net-spinning caddis-flies and the nymphs of stone-flies and may-flies. Here they live beneath sheets of silk spun over exposed surfaces of current-swept rocks. In structure their unbranched, filamentous gills, and expanded, fan-like setæ of the labrum and labial palpi will distinguish these larvæ from any other described species. Their pupæ, unlike other lepidopterous pupæ known to us, are completely submerged. The life history and description of the larvæ and pupæ are given more in detail on the following pages.

***Elophila fulicalis* Clemens.**

Habitat.—During the summer of 1911 larvæ of this species were found in Fall creek, about one mile east of the Cornell campus. At the place where they occur most abundantly the creek is very swift, flowing over a rough bottom of loose rocks. The depth at low water varies from less than an inch to more than two feet. During the spring freshets both depth and width are very greatly increased and the stream becomes a roaring torrent. The larvæ also occur, though in less abundance, in the swift water on the flat rock floor a short distance above and below the locality described. The bottom of the creek is deeply coated with diatomaceous ooze intermixed with a deposit of silt. This ooze is present on the upper and absent from the under surfaces of the rocks.

Cascadilla Creek, less than a mile distant from Fall Creek, is slightly smaller especially during the dry season. In other respects the two are very similar. In view of the fact that this larva inhabits only a limited area in Fall Creek and is absent in similar localities in

¹ Contribution from the Limnological Laboratory of the Department of Entomology in Cornell University.

Cascadilla Creek it seems evident that its distribution is extremely local.

Larval Habits.—During the spring and early summer of 1913 search was again made for the larvæ but none were found until July 20. The cases found at this time were entirely different from those taken from the same locality in August, 1913. It was later discovered that the 1911 larvæ were in pupa cases.

The larval cover, pl. 2, fig. 4, is a thin, flexible sheet of silk, irregular in outline and closely cemented to its support throughout the greater extent of its margin. At two or three places it is not attached, these openings allowing free circulation of water.

The size of the silk sheets, pl. 2, fig. 4, when first found varied from one half inch to more than two inches in length and were about one fourth inch in width. Some were simple, others showed irregular branches. On July 26 some sheets were five inches long and more than an inch wide. On the latter date two pupal cases, the first of the season, were found. These contained larvæ which had not started their inner cocoons. On July 30 larvæ were still more common than pupæ but by the 5th of August almost all had pupated.

It is probable that there are two broods in a single season for in the bottles containing pupæ and pupal cases were discovered several small larvæ of the same species which ranged from 3 to 6 mm. in length. These larvæ were not seen when collected, but probably were picked up with the pupal cases. Additional evidence of an earlier brood was given by the occurrence of several adults among the insects caught in a traplantern in June.

Food of the Larvæ.—The organic contents of the stomachs consisted entirely of algæ. Most abundant were *Scenedesmus* and fragments of filamentous *Chlorophyceæ*; diatoms and *Pediastrum* were also found, as well as a large amount of silt. It is surprising to note that in the stomachs the green algæ were in greater abundance than the diatoms, although in the ooze which surrounded the larvæ diatoms greatly outnumbered the green algæ.

Pupal Habits.—Shortly before the time of pupation the silk sheets are removed and a cover of an entirely different nature is formed. This removal of the silk sheets leaves clean scars on the rocks, pl. 2, fig. 5, which in color, contrast strongly with the surrounding diatomaceous coating. Within these scars, sometimes in the center, some-

times on the edge, the pupal cases are located. The cases, pl. 2, figs. 5, 6, are oval in shape, about three quarters of an inch long and half an inch wide and are elevated about one tenth of an inch above their support. Their roofs are flat and are supported by perpendicular side walls which are perforated at each end by six or more clean-cut holes to permit free circulation of water. The inner pupal case consists of a sheet of loose-spun silk. Radiating threads attach the cocoon to the roof but, as in the case of the larval sheets, there is no silk floor over the surface of the rocks. The pupal cases, unlike the larval sheets, are spun of thick inflexible layers of silk and, also unlike the larval sheets, become thickly coated with diatomaceous ooze.

Period of Emergence.—The first adults were seen August tenth. By August seventeenth they had reached their maximum numbers, fairly swarming as one walked through the vegetation along the water edge, but seldom occurring more than a few yards from the stream. By August twenty-eighth no adults could be found.

DESCRIPTION OF LARVA AND PUPA.

Larva.—The length of mature larva, Pl. III, fig. 1, is ten to eleven mm., its form is depressed tapering gradually from its head to the end of its tenth abdominal segment. Its color is dark straw-brown. The unbranched, hairlike tracheal gills form a double row along each side of the thorax and abdomen. The upper line of gills is plainly suprastigmatal in position and the lower line is infrastigmatal. The arrangement and distribution of the gills makes it impracticable to apply the other terms, anterior- and posterior-stigmatal, used by Forbes in "The Aquatic Caterpillars of Lake Quinsigamond," *Psyche*, December, 1910.

Head.—Almost circular in outline, heavily chitinized, its diameter at least as great as any segment of the body. A narrow, heavily chitinized band, Pl. III, fig. 4, along the posterior side of the frons forming a conspicuous dark brown V shaped mark. A similar band borders the hind margin of each epicranium. The middle pair of setæ on each lobe of the labrum, Pl. III, Fig. 2, are modified into thin, transparent, fan-like plates with irregular margins at the distal, or broad, end of the fans. Their bases are heavily chitinized, circular in outline and resembling the bases of ordinary setæ. They arise

from setigerous punctures. The terminal setæ of the labial palpæ are dilated, Pl. III, figs. 3 and 5. The arrangement of setigerous punctures on the labrum is shown in Pl. III, fig. 2; on the head in Pl. III, figs. 3 and 4.

Thorax.—First thoracic segment heavily chitinized and without gills. Second and third segments thinly chitinized and with a single group of from two to five unbranched gills above each leg. The distribution of setæ on the dorsum is shown in fig. 1, Pl. IV. On the ventral side there are numerous small setæ, which are especially abundant on the legs.

Abdomen.—The first eight abdominal segments have filamentous, unbranched gills distributed in two rows, supra- and infra-stigmatal in position. The supra-stigmatal gills occur in groups of from two to four near the cephalic border of the segment. Variation in the number of these gills occurs in different individuals, and even on the two sides of the same segment of the same individual. A single supra-stigmatal gill may be present near the caudal margin of any abdominal segment. This gill, when present on one side, may be absent from the other side of the same segment. The infra-stigmatal gills are arranged in a single, nearly straight row, along each side of the first nine abdominal segments. From three to five of these gills occur on each segment, arising from lateral folds of the body wall. On one specimen in my possession a single dorsal gill is present near the caudal border of the ninth abdominal segment, midway between the mid-dorsal line and the lateral margin. The tenth abdominal segment is without gills and is roundly bilobed at its caudal extremity. On abdominal segments three to six, inclusive, there are oval prolegs, each ending in a terminal ring of about thirty-two hooks. Long and short hooks alternate on these circles. On the last abdominal segment the prolegs are more oval in outline than on the preceding segments and the hooks, about fifteen in number, are arranged in a single line with their bases pointing cephalad, instead of forming a circle as on the other segments.

Young Larvæ.—The young larvæ have noticeably fewer gills than old larvæ. The smallest specimen in my possession (length 3 mm.) has as many as four infrastigmatal gills on only one side of one segment. Other clusters of infrastigmatal gills are composed of three or two gills. The superstigmatal gills also average fewer than on the mature

larvæ, two being not an uncommon number for a cluster. Otherwise the young larvæ agree in structure with the mature larvæ.

Pupa.—Pl. III, figs. 6 and 7. Length 6 to 7 mm., breadth 2 mm. Color of alcoholic specimens, head and thorax dark brown above, appendages lighter, except caudal margin of wing-pads, which are dark. Abdominal segments dark brown above ringed with cream color at the edges of segments, sides and venter of abdomen cream color. Anal anchor dark brown, almost black. Third and fourth abdominal segments with large tubular spiracles surrounded by a light area which is encircled by a narrow chitinous band. Vestigial spiracles are visible on abdominal segments 5 to 9, inclusive. Vestigial prolegs are on abdominal segments 6 and 7. The strongly chitinated abdominal anchor measures one mm. from tip to tip. The positions of setæ are shown in Pl. III, figs. 6 and 7.

TWO ALLIED SPECIES FROM COLOMBIA, SOUTH AMERICA.

Besides the species, *Elophila fulicalis*, from New York State two species of lepidopterous larvæ were taken from a swift stream in Colombia, South America. These larvæ are so similar to the one previously described that a brief description is included here.

Species *A*, the smaller of the two, measures six mm. in length and a half mm. in breadth. Its form, unlike the other species which is greatly depressed, is almost cylindrical. In color the alcoholic specimen is uniformly dark brown, except the gills which are slightly lighter, some gills being encircled near the middle by a single band of black. They are arranged in supra- and infra-stigmatal series as in *Elophila fulicalis* and, as in that species, are not alike in number on the two sides. Also unlike *E. fulicalis* the gills of both the supra- and infra-stigmatal series are arranged in anterior and posterior groups, but these groups may vary in number on the two sides of the same individual or may be entirely wanting. The first thoracic segment bears no gills, the second and third thoracic segments bear supra and unlike *fulicalis*, infra-stigmatal gills. This larva has a group of five dorsal gills on the posterior border of the ninth abdominal segment midway between the lateral line and the lateral margin Pl. III, fig. 10.

The head in form is much more rounded than *E. fulicalis*. The labrum is shown in Pl. 2, fig. 7. Four setæ on each side are broad-

ened at their distal ends and two setæ are pointed, but these latter, like all setæ of the head, are flat. A small area on the tip of each lobe is covered with fine, short hair. The mandibles, Pl. IV, fig. 8, are short, heavily chitinized and not deeply notched. The frons is glabrous and without pattern. Its two middle setæ are nearer to each other than to the lateral setæ.

The thorax has the first segment heavily chitinized, with a well marked dorsal suture along the median line. A row of five setæ is visible from above on each side of this segment. The second and third segments are not heavily chitinized. Each of them has a single dorsal seta in front of the gills and nearer the median line. On the ventral side each thoracic segment bears a strong seta outside of each coxa.

The abdomen has circular prolegs on segments three to six inclusive and oval prolegs bearing a single line of hooks on the last segment, as in *E. fulcalis*. On the dorsal side there is a single seta back of each group of anterior stigmatal gills, and on the ninth segment a crescentic line of six setæ. On the caudal border of the last segment there are four strong setæ, Pl. IV, fig. 10.

Only one specimen of this species was found.

Species *B*, the larger South American larva, measures fifteen mm. in length and three mm. in breadth. Its form is more depressed than the small South American species but less flattened than *E. fulcalis*. In color it is uniform brown with lighter gills. Its gills follow the same general arrangement as the preceding species. The infra-stigmatal gills are not present on the second and third thoracic segments. On the abdomen they form a continuous line on each segment, rather than forming groups, as in the other Colombian species. The supra-stigmatal are absent from the first thoracic segment, but present on all other segments, except the last abdominal. The gills are more numerous than on either of the two preceding species, as many as eighteen being present on one side of some segments. In number they vary greatly.

The head is more flattened than the head of the other South American species. The frons and adfrontals are glabrous and have a color pattern of minute dark hexagons. Other parts of the head are glabrous and without pattern. The labrum has three setæ on each lobe flattened and expanded at their distal ends. The distribution of

hair and setæ is shown in Pl. IV, fig. 2. The four setæ of the frons are equidistant from each other and the end punctures are the same distance from the margin as from each other.

The thorax has the first segment heavily chitinized and has two lateral humps corresponding in position to the supra- and infra-stigmatal gills of the following segments. Each of these humps is tipped by a strong seta. These setæ and about five others on each side complete a line across the dorsum. Two other punctures are present behind this line of setæ, the more caudal one being the farther from the median line. On the ventral side of the thorax there are numerous small setæ, especially abundant on the legs.

The abdomen is widest at about its third segment and from there tapers gradually to the tip. Prolegs are borne on the third to sixth abdominal segments and on the tenth. Those of the tenth segment are well developed, point caudad and are plainly visible from above, Pl. IV, fig. 3. A few small setæ are present among the supra-stigmatal gills. Other well developed setæ on the dorsal side are represented in Pl. IV, fig. 3. On the ventral side there is a line of four setæ across the ninth segment and several small setæ are present at the base of each proleg.

Five specimens of this species were taken.

The pupa of this species is much like that of *E. fulicalis*, the most noticeable difference being the presence of two wart-like prominences bearing strong setæ on the cephalic margin of the head. The setæ on the abdomen are longer and stronger and the caudal anchor has a longer shank. Also the appendages are longer in proportion to the total length of the body. The cast larval skins found in the cases with these pupæ furnished sufficient characters for identification.

Both species of South American larvæ were found in a swift Andean stream that flows into the Cauca River about half way between the cities of Cali and Popayan. They were collected on the 19th of February. At that time the larvæ collected were taken from the cases represented in Pl. IV, figure 1. Since many pupæ and one empty pupal skin were found it is evident that the imagos were then emerging, but larval cases may have been present and overlooked, for at that time we were not familiar with these sheets. The pupal cases Pl. IV, fig. 1, are similar to those found in Fall Creek but have more flaring edges and the perforations, which are farther from the edge,

form a complete oval on the top rather than on the side of the case. These perforations are more symmetrical than those of *E. fulcalis*.

EXPLANATION OF PLATES.

PLATE III.

- Fig. 1. *Elophila fulcalis*, larva.
- Fig. 2. *Elophila fulcalis*, larva, labrum.
- Fig. 3. *Elophila fulcalis*, larva, maxilla and labium in part.
- Fig. 4. *Elophila fulcalis*, larva, head, dorsum.
- Fig. 5. *Elophila fulcalis*, larva, labial palpus.
- Fig. 6. *Elophila fulcalis*, pupa, ventral.
- Fig. 7. *Elophila fulcalis*, pupa, lateral.

PLATE IV.

- Fig. 1. Pupal case of *Elophila* sp. *B*.
- Fig. 2. Labrum of *Elophila* sp. *B*.
- Fig. 3. Abdomen of *Elophila* sp. *B*, dorsum.
- Fig. 4. Larval sheet of *Elophila fulcalis*.
- Fig. 5. Pupal case and outline of larval sheet of *Elophila fulcalis*.
- Fig. 6. Pupal case of *Elophila fulcalis*.
- Fig. 7. Labrum of *Elophila* sp. *A*.
- Fig. 8. Mandible of *Elophila* sp. *A*.
- Fig. 9. Mandible of *Elophila* sp. *B*.
- Fig. 10. Abdomen of *Elophila* sp. *A*, dorsum.

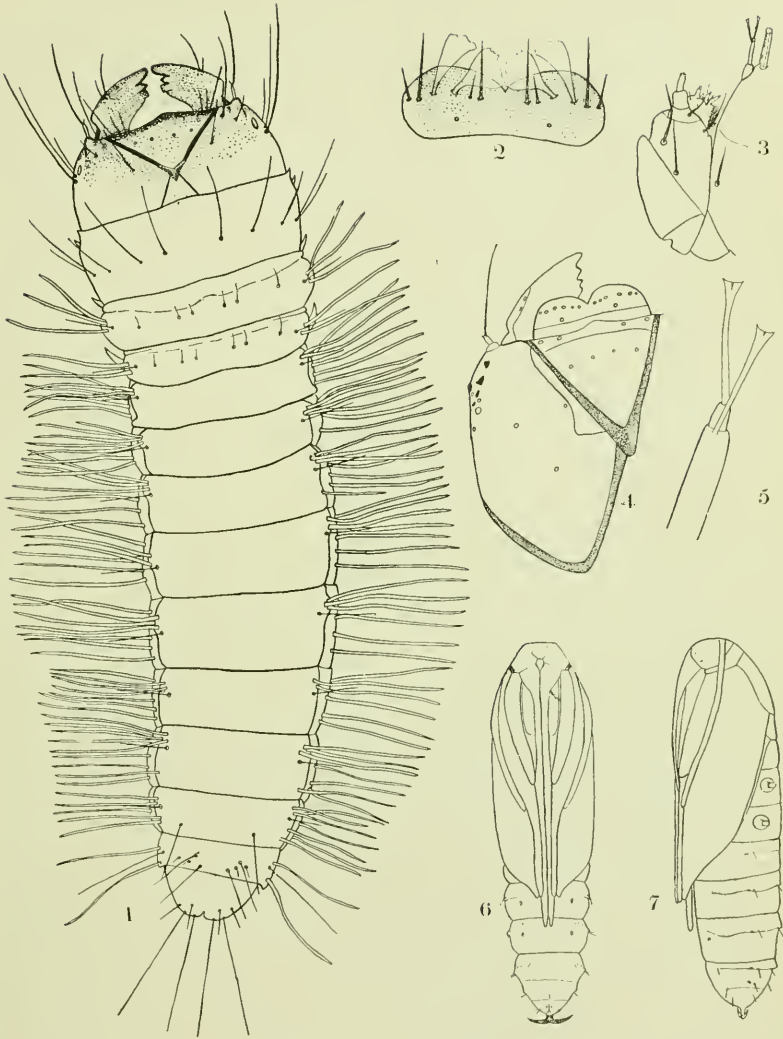
ERYCINIDÆ AND LYCÆNIDÆ FROM THE ISLAND OF TRINIDAD.

BY WILLIAM PHILLIPS COMSTOCK,

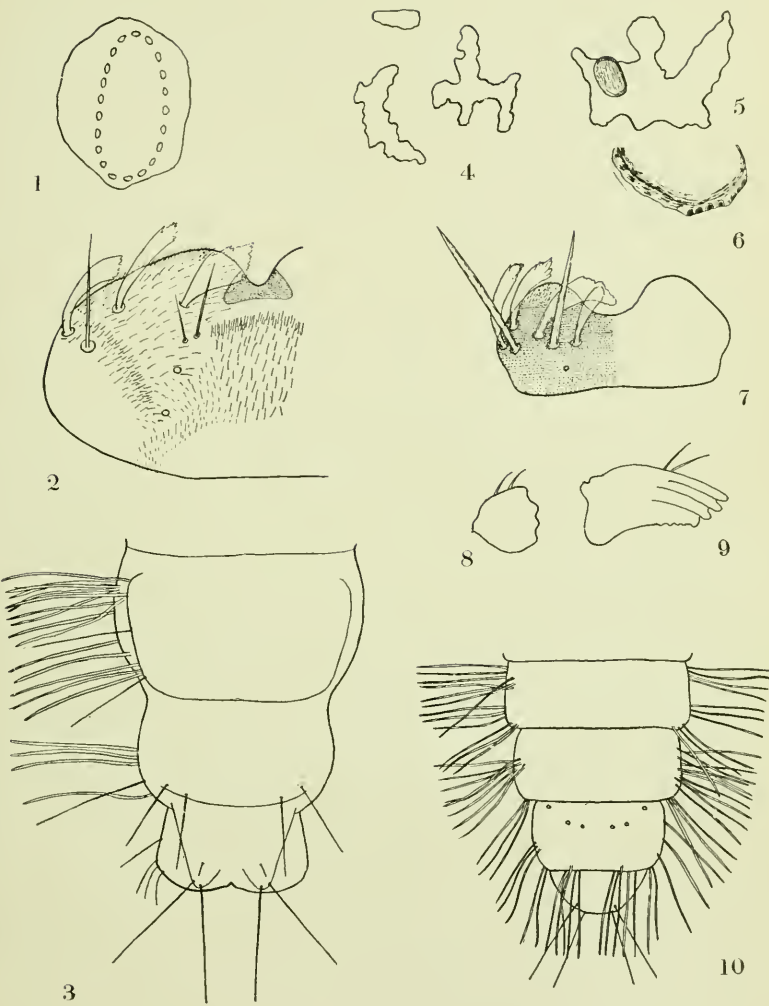
NEWARK, N. J.

My attention was first attracted to this subject on receiving a small consignment of butterflies from the island, all caught in one day by H. S. Parish. He says of the collecting:

"Trinidad lies about 16 miles from Venezuela eastward and is just above the 10th degree of latitude. Its average length is about 48 miles and breadth 35 miles. The largest town and principal port is Port of Spain. Being so near Venezuela it is a very productive place for the naturalist. I arrived just when the sun was rising, and



Aquatic lepidopterous larva.



Aquatic lepidopterous larva.

no place I have visited can be compared with it for beauty of landscape. The steamships have to anchor out about 2 miles because the bay is so shallow that they cannot come close to shore. We went ashore in a small steamer and the first thing I did was to catch a tram car and proceed to the Botanical Gardens as I had only about 4½ hours to stop there. The sky became overcast shortly before we left the ship and it started to rain; one of those tropical rains and so heavy was it that you could not see a dozen yards in front of you. But it cleared off about 10:30 A. M. Then net in hand and cyanide bottles, collecting box, etc., over my shoulder, I was ready for work.

"The first thing that drew my attention was the number of Lycænidæ that were flying about everywhere. They were mostly of one kind (probably *Lycæna cassius*, Cramer), but after I went further into woods or forest, for it is practically a forest, one could see butterflies and skippers of almost every color flitting about. Some were flying about flowers while others have the peculiar habit of lighting underneath the leaf; almost all of the Erycinidæ having this habit. I had been in British Guiana, South America, and away back at a place called Mallali, 175 miles back from Georgetown, and I never saw butterflies there in such numbers as I saw them in Trinidad considering the short time I had to stay.

"My time was getting short, but pushing on I noticed a clearing which I thought I would take in. Here I found 15 or 20 different species or varieties, and while I was placing my captures in envelopes I just happened to look at my watch and found that I had just three-quarters of an hour to get down to the wharf and get out to the Dutch mail boat which sailed shortly afterwards."

This is the list caught on May 5, 1913.

ERYCINIDÆ.

<i>Limnas jarbas</i> Fabr.	1 pair.
<i>Charis nilus</i> Felder	3 males.
<i>Nymphidium molpe</i> Hübner	1 female.
<i>Theope herta</i> G. & S.	1 female.

LYCÆNIDÆ.

<i>Thecla palegon</i> Cramer	1 male.
<i>Thecla crolus</i> Cramer	1 female.
<i>Thecla celmus</i> Cramer	1 female.
<i>Thecla beon</i> Cramer	1 pair.

<i>Thecla</i> sp. in beon group, <i>politus</i> , H. H. Druce?	1 male.
<i>Thecla</i> sp.? in beon group	1 male.
<i>Thecla</i> sp.? in beon group	1 male.
<i>Thecla azia</i> Hewitson	10 specimens.
<i>Thecla salona</i> Hewitson	1 male.
<i>Lycæna cassius</i> Cramer	9 males, 5 females.
<i>Lycæna hanno</i> Stoll	3 males, 2 females.

The capture of 15 species of Erycinidæ and Lycænidæ in a day would lead one to suppose that these families might be numerous in species in the island, and that such is the case is shown by the paper by Mr. William J. Kaye, in the Transactions of the Entomological Society of London for 1904 where there is presented a catalogue of the Lepidoptera Rhopalocera of Trinidad, listing forty-three species of Erycinidæ and thirty-six species of Lycænidæ with the descriptions of several new species and the erection of some new genera. *T. azia* Hew. and *T. salona* Hew. are new to his list and may be some of the doubtful species in the beon group.

In his book "Butterfly collecting in many Lands," Mr. G. B. Longstaff described a collecting expedition on the Island of Trinidad and added two species to the list, *T. spurius* Felder and *T. syncellus* Cramer. Being so close to the mainland of South America, it is natural of course to expect a large number of species and it is probable that additional species will continually come into the list.

SOME DRAGONFLIES OF A CONNECTICUT BROOK.¹

BY LEWIS B. WOODRUFF,

NEW YORK, N. Y.

With the western boundary of Connecticut constituting the south-eastern boundary of New York, any matter relating to the faunal status just across the line should be of peculiar interest to members of this Society; and where that fauna includes creatures unfamiliar to most of us, and concerning which but little has been published, no apology would seem to be required for calling your attention to a few of them.

¹ Read before the New York Entomological Society.

For these reasons I shall present a few brief notes of an afternoon's observations on a little brook at Litchfield made on the last day of June, 1913.

This town is situated in the northwestern corner of the state, in the so-called Berkshire Hills region, with a fauna and flora decidedly Alleghanian; but now and again indications are met of a southward extension of the Canadian. Especially is this true as respects the plant life and the birds, to which more particular attention has been given by the writer; but the insect fauna likewise shows a tendency toward the characteristics of more boreal conditions. With this suggestive preface of what the cold waters of this hilly country may offer, the subject of my paper must now be introduced.

A typical New England mountain brook comes tumbling down over the stones through a thickly wooded valley just north of the town. Meeting the village hill it veers to the east, there to be arrested by a dam to form a small mill-pond; then, liberated again, it sweeps on around the foot of the village and empties into a larger pond. Its flow from this continues, and of differing character; but we have to do now only with an eighth of a mile of its course between the heavily wooded, steep-sided hog-back hills. The woods are of oak, chestnut, beech and birch, with an occasional red elder and frequent hemlocks, while great masses of laurel in full bloom bank the brook in a glory of pink and white. On either side ring out the nuptial songs of northern warblers, such as the Black-throated Blue and the Canadian Warbler, with others more to be expected, all busily engaged in the duties and joys of raising their broods; and into the sunlit spaces over the water, which one must perforce wade, dart infrequent dragonflies, teasing the eyes to follow them through the intervening shadows. One's attention is caught by one of these of unfamiliar aspect, evidently an *Agrion*, skimming hither and thither close to the ripples. Its flight too is peculiar, not after the manner of *A. maculatum*, slowly fluttering in an aimless way among the verdure along the banks, nor even of the more active *A. aquabile*, also present in some numbers, but suggesting more the hunting tactics of a Gomphine, even to the frequent alighting for rest on the mid-stream stones. It proves to be *A. amatum*, Hagen, described from New Hampshire, and in the state New York recorded on two occasions from the Adirondack region. Others are soon noted, the females with strongly

flavescient but unmarked wings, the males clearer winged, but with dark tips to the hind ones. They were fairly numerous, and, flashing back and forth over the brook, with the sunlight making resplendent the long blue-green metallic abdomens of the males and the more coppery females with their bright yellow sides, the community presented a never to be forgotten scene. The males frequently indulged in contests, usually two, sometimes three, taking part in vigorous chasings and dodgings which would be maintained for several minutes at a time, when they would separate, resume their hunting, then suddenly renew the game. While they never seemed actually to close in battle, yet the performance strongly suggested conflict, and bore little resemblance to the graceful dance of *A. maculatum*.

Soon after the dip of the sun back of the steep hill forming the brook's western bank, these Agrions began to seek rest from their labors, perching on the leaves of bordering shrubs and trees at heights ranging from six to twelve feet up, where they doubtless spent the night.

It was the writer's first introduction to this species, so there was added the joy of discovery to the æsthetic delight a colony of such beauty must have given any beholder.

A hemlock-shaded, rockbound pool setting off from the main course of the brook proved to be the home, or resort, of the more familiar *Cordulegaster diastatops*. From time to time one of three or four individuals would leave its resting place on the low branch of an overhanging bush, and sweep with lightning speed over its clear depths; then circling its shores from end to end it would reach and follow the narrow grass-arched connecting channel out to the stream and back. On one of these forays the capture of an *Argia putrida* was noted. It was done in the twinkling of an eye, in spite of the activity and apparent agility of the prey. The dragon saw the damsel, seized her, and that was the end of her story. With his quarry he rose at once and almost vertically to a branch at the height of about forty feet, where he proceeded to the undisturbed enjoyment of his meal. This seeking of a lofty altitude for that purpose seems to be customary with members of this genus, it having been noted on several occasions in the case of both this species and *C. obliquus*.

Although several species of Libellulidæ were observed, they were probably for the most part wanderers; the character of this part of

the brook being unsuited to open water species. It was eminently suitable, however, for certain of the Gomphinæ, and of these *Ophiogomphus johannus* was the largest and most conspicuous, with its rich green thorax and broadly spatulate abdomen plainly apparent as it hunted low after the manner of its kind. By no means abundant, it was yet apt to be found wherever the brook's bed widened sufficiently to disclose uncovered gravel along its edge.

This species, when ready to abandon its nymphal existence for that of the imago, leaves the water at some sandy or gravelly margin where, resting on the ground or on the side of a stone close to the water's edge, it awaits the splitting of its dorsal covering, and slowly drags itself from its prison house. The metamorphosis takes place toward the end of May, and even on sunny days occurs several hours after sunrise.

As the nymph is as yet undescribed I present herewith a brief description based upon the exuviae.¹

Next in size, but much rarer, was *Gomphus brevis*, a species included in the New Jersey list, but distinctly northern in its range. Nothing distinctive concerning its habits was noted on this occasion, the mere fact of its presence in the state alone entitling it to mention.

And lastly the dainty little *Lanthus albigylus*, hardly larger than the *Argias*, swift-flying, and resting preferably on stones not over an inch or so above the surface. While but one female of this species was taken, the males were found sparingly all along the course of the brook under observation; but always singly, each apparently excluding his confrères from his own particular hunting ground.

Except for *Argia mocsta putrida*, fairly common, and hunting and resting for all the world like a Gomphus too, this part of the brook was not attractive to many other Zygoptera, the only other species noted being a very few *Enallagma geminatum*, *exsulans* and *ebrium*, all exceedingly abundant further down its course, the omnipresent *Ischnura verticalis*, and one *Chromagrion conditum*, the latter the only one ever taken by me at Litchfield.

Making a brief digression to the west of the brook, we come upon a small, cold, spring-fed pond. Its shores are for the most part steep and rocky, and all well wooded; but an occasional narrow stretch of sand and stones, gay with rose pogonias and pitcher plants

¹ Published in this Journal Vol. XXII, p. 61.

in flower, is bordered with a fringe of reeds and rushes in shallower water. In the latter environment was found a colony of the beautiful little *Leucorrhinia frigida* of Hagen, described from Massachusetts, but recorded from comparatively few places, and these mostly to the north of us. So it was with especial delight that I seized the opportunity for making the acquaintance of these little strangers. Strongly pruinose, the eye from its vantage point on the shore held them easily, particularly as they seemed less inclined than their cousin *L. intacta* for far-reaching excursions, preferring to keep in close proximity to the reeds. Here they hunted, darting actively about close to the surface, dodging here and there among them, and occasionally alighting for rest on their stems only three or four inches above the breeze ripples. Their more numerous associates were *Ladona exusta*, with *Gomphus exilis* quite common; and in lesser numbers *Celithemis elisa* and other generally distributed species.

Returning to the brook, it was soon wholly in shadow, though the warm sunshine still bathed the opposite hillside. The time had come to turn back, and I stood in midstream beneath a great low-hanging oak limb weighing the difficulties of the way home through the dense steep-sloping woods, with its laurel tangles and fallen logs, against the retraversing of the rough stony bottom involving certain infliction of many ankle twists and foot-bruises, already suffered to excess on my way up stream. Over the water swiftly zigzagged innumerable Tipulidæ, not seen while the sunlight fell on it, and so close to the surface as to seem actually to be skimming it; while on a stone at my feet crawled the full grown larva of a stone-fly, soon to leave his fast-clinging exuvia to bleach there throughout the summer. The sudden swoop of a Broad-winged Hawk, as it swept beneath the oak bough on its course down the valley, almost startled me from my footing, but left the wild beauty of the scene more than ever wrapped in breathless silence. Standing there, my indecision brought its reward in the joy we all feel in finding ourselves the observers of shy wild life unconscious of our presence. About two rods down stream there sprang out from the bushes an old weasel, immediately followed by another. With slow, graceful leaps from stone to stone they crossed the brook, there about twenty feet wide. Reaching the opposite shore they found a big flat rock in convenient position, where for a while they sported with each other like kittens. After a bit

they sat up, very erect, their white underparts toward me, and remained quite motionless for several seconds. Apparently satisfied with conditions, they turned and disappeared into the bushes, only to appear again in a moment with one—two—three others; whereupon all five in single file, set out on their deliberate return to the bank where the two had first appeared. To see such wild creatures in such numbers, and at such leisure, was a new experience for me, and a very delightful climax to my afternoon on the brook.

ON THE WORK OF THE LATE DANIEL W. COQUILLET AND OTHERS.

BY W. R. WALTON,

HYATTSVILLE, MD.

Mr. C. H. T. Townsend has made a recent publication¹ the occasion for some critical remarks concerning the work of contemporary workers in the Muscoidean flies. The greater part of this comment is distinctly favorable in character. In fact, an odor of flattery is quite perceptible throughout most of the paper. This complimentary attitude is suddenly discarded at the conclusion of his remarks with the following statement: "Practically all of the work reviewed above is *constructive*, and as such it is to be emulated. . . . Contrasted with this work is that performed by the late Mr. Coquillett, which was *destructive* in that it attempted to sink into the synonymy valid generic and specific names. Such work is a pulling down which leaves us worse off than before."

Thus according to Mr. Townsend our work is constructive, but strange to say, he fails to perceive the fact that it is based almost wholly upon that of the late Mr. Coquillett, which is denounced as "destructive." Behold a paradox. The permanent based upon the ephemeral, which is absurd, as brother Euclid is fond of remarking.

Now what are the facts concerning this cataclysmic work of the late Daniel W. Coquillett as viewed by an earnest, if humble, student of the same?

¹ JOUR. N. Y. ENT. SOC., Vol. 21, p. 301.

It may safely be stated as a postulate that, if a synoptic writing succeed in conveying to its students the means of arriving at its author's concept of the entities included therein, it must of necessity be considered as having attained the end for which it was created. Mr. Coquillett's work has passed this test. It is certainly true that many of his descriptions are much too brief. Also his palette is set with but two colors; namely, black and yellow. Of these, his black is often not black, and his yellow may be any tint ranging from true yellow to reddish brown. Nevertheless, enough structural or other characters are usually included to enable the student to follow his meaning in most cases. In other words, the entities included are recognizable as the author saw them. That he was sometimes wrong in his point of view does not alter the intrinsic value of the synopsis materially.

Again, if such a work afford other investigators a practicable basis for future discussion, it must be considered as possessing value. It may be stated with perfect truth, that every worker mentioned in Mr. Townsend's recent article has used the Revision of the North American Tachinide as a basis for his investigations. This in my estimation is the significant point to be kept in mind while judging Mr. Coquillett's work. Brauer and Bergenstamm's publication, excepting always its superb illustrations, has suffered because it is incomprehensible to most investigators.

Mr. Townsend has complained many times in print of the injustice done him by the synonymy as compiled by Coquillett. But, sad to relate, without its voluminous synonymy, this really monumental work would be as difficult of comprehension as most of that which it has supplanted. In this synopsis Mr. Coquillett undoubtedly sank some names, both generic and specific, which either have been or will be revived. His manuscript notes show that he himself recognized this fact. But Mr. Townsend's statement to the effect that "Whenever it was possible so to manipulate type designations as to sink genera, he has not neglected the opportunity," I regard as unjust in its insinuations. I much prefer to believe that Mr. Coquillett acted from conviction alone in these matters.

Any person who has the opportunity of comparing Mr. Townsend's type specimens with his published descriptions can readily understand why at least some of his creations have been relegated

into "innocuous desuetude." Thus, the type specimen of his *Myio-
phasia* (*Locavia*, *Enyomma*) *globosa* possesses a single weak, median
marginal bristle on the right side of the second abdominal segment.
This becomes a "marginal pair" of macrochaetae in the original de-
scription. A most scrupulous examination of the type shows beyond
dispute that the opposite bristle never existed except in the imagination
of the describer. Francis Walker and Robineau Desvoidy both
possessed this gift of ultra-microscopic vision.

Mr. Townsend professes admiration for the work of Mr. Robineau
Desvoidy, but remarks¹ that the writings of Mr. Coquillett "will all
have to be revised." So will mine and yours, dear reader. Let us
hope that posterity will deal more tenderly with it than has been the
fate of Robineau Desvoidy.

On the other hand, Mr. Townsend has failed to see structures
which are not only visible but even prominent, providing the specimen
be carefully examined. For instance, in his genus² *Ocstrogaster*
(Catalog number 15148, U. S. N. Mus.) he says, "No palpi," etc.
The type specimen bears a perfectly good pair of well developed
palpi, situated in the usual place on the proboscis. Or again he ap-
parently becomes suddenly color blind as in the case of *Dejcania*
*andina*³ "Close to *braziliensis* Desv. and *armata* Wied. differs in
having no yellow whatever on the legs." Almost immediately below
this we read, "Legs wholly yellow!" The type specimen of this
species is now in the possession of three pairs of very yellow legs
indeed. Evidently, this large and varied assortment of synonymy
in Mr. Coquillett's work has some basis in fact.

It would seem that the possession of "that keen judgment of
character values and natural appreciation of phylogenetic relations,"
cannot preserve even a "master zoologist" from palpable error when
he does take sufficient care to see what is visible.

In the year 1891, Mr. Townsend began descriptive work in the
Muscoidean flies.⁴ It might be of interest to inquire as to what dis-
position has been made of the several species proposed in this first

¹ Insector Insc. Mens., Vol. 1, p. 115, 1913.

² Descriptions of New Genera and Species of Muscoidean flies from the
Andean and Pacific Coast Regions of South America, Proc. U. S. Natl. Mus.,
Vol. 43, p. 309.

³ Loc. cit., Natl. Mus., Vol. 43, p. 333.

⁴ Proc. Ent. Soc., Washington, Vol. 2, p. 134.

paper. The first four species proposed are placed in *Hyalomyia*; they are called *punctigera*, *aldrichii*, *robertsonii* and *purpurescens*, respectively. These are each and all sunk under *Phoranthia occidentis* Walker, by Mr. Coquillett. There exists scarcely a shadow of a doubt that they belong there. The next species proposed is *Trichopoda aurantiaca*. This appellation has since given place to *cilipes* Wied. Then follows one called *Cistogaster pallasii*. This description was unrecognizable to Mr. Coquillett, but Dr. J. M. Aldrich says¹ "The type looks to me like a melanic variety of *immaculata*." The next species proposed is *Ocyptera argentea*; it survives as such. The next and last species described is called *Wahlbergia atripennis* which name now rests in peace under the inscription *Xanthomelana atripennis* Say.

Thus it is seen that of seven proposed species but one has escaped extinction or the stain of grave suspicion.

The late Dr. John B. Smith once stated his belief in the theory that a man's earlier work is usually an index to what may be expected of his more mature state of development. Let us see whether or not this theory applies in the case under scrutiny. Seventeen years have passed, as the story books say. Mr. Townsend can no longer be considered in his callow youth as a dipterologist. He has published rather plentifully meantime. Among the most important of these writings is one called the *Taxonomy of the Muscoidean Flies*.² Throughout almost this entire work he lays himself open to criticism by incautious proposals and generalizations. The student will find on page 118, the proposal of ten new species of *Lucilia* all based on the most trivial of chaetactic characters. These have recently retired³ to a well-merited oblivion under the work of an able young investigator, Mr. J. D. Tothill. Seventeen years of experience have evidently made little change in the methods of the irrepressible Mr. Townsend.

In 1908, it became apparent, chiefly through the work of the Gypsy Moth Laboratory staff, including Mr. Townsend, that some taxonomic possibilities resided in the reproductive organs and methods of reproduction in the Muscoidean flies. He at once turned his atten-

¹ List of North American Diptera, p. 422.

² Smithsonian Inst. 1908.

³ Annals Ent. Soc. America, Vol. 6, p. 241.

tion to this line of investigation with his usual exuberance and lack of restraint. This has led him into some of the most egregious errors of his long career. Undoubtedly the most daring of these is the attempted erection of some nine genera comprising eleven species based, as he says, "on the reproductive, egg and first maggot structures." But, it should be explained, at the time these descriptions are published, it is admitted there are before him nothing whatever but the viscera of the specimens involved in the discussion. Furthermore, the location of the remainder of the carcasses is unknown to him! They may be, according to his statement, "at the Gypsy Moth Laboratory," or in "the National Museum collection" or . . . they may not be in existence for all that Mr. Townsend knows, because he has been located thousands of miles distant from these places for years. But worst of all, no description whatever of the external character of these flies is afforded us. Even Francis Walker was never guilty of an offence against entomological science equal to this. Of course the designations included in this category cannot stand as valid names, because they are based on fragments of the insides (to use a colloquialism) of insects, the external appearance of which is unknown to science.

It would be easy to cover many pages in criticism of Mr. Townsend's recent work on the Muscoidean flies. Enough has been said however to warn the student not to regard it too seriously. It is to be hoped that the disorderly array of information and misinformation which he has been guilty of publishing will not prevent young workers from entering the field of tachinology. If we keep in mind the fact that our work in systematic entomology will surely be successful in precisely that degree to which it proves practicable, we shall not go far astray.

It may contain the quintessence of wisdom and constitute a paragon of ingenuity, but if these qualities are not made comprehensible to our fellow workers, we may feel assured that our work will suffer accordingly.

The systematist who cannot see things as they are, or tell the unvarnished truth regarding what he sees, would better not have been born in so far as the interests of science are concerned. Some things have been said in this discussion which may seem harsh to the person most concerned. If so, I ask his pardon for having said them.

No personal slight whatever is intended thereby, and not a trace of malice or resentment on the part of the writer colors any statement made herein. But I conceive that these criticisms would much better be said now, while the subject of them is present to explain this position, than in some distant future, when time shall have sealed his lips and stayed his busy pen forever. His fine command of English and evident scholarship will then avail him nothing, if some surviving, or perhaps yet unborn student rise up and brand his work *destructive*.

NEW HEMIPTERA-HETEROPTERA, WITH COMMENTS UPON THE DISTRIBUTION OF CERTAIN KNOWN SPECIES.

H. G. BARBER,

ROSELLE PARK, N. J.

Chlorocoris flaviviridis new species.

Color yellowish-green, subshining, coarsely punctate. In shape long ovate; measuring to the tip of the membrane about twice as long as the breadth of the pronotum. Head as long as the width across the eyes, the lateral lobes rounded at their apices, a trifle longer than the tylus but not contiguous before it, the surface of lateral lobes basally, base of tylus and vertex of head transversely wrinkled, in front of each ocellus, next the eyes, is a decolorous smooth patch; lateral margins of head lightly raised, smooth, pale and slightly concave a short distance before the eyes. Antennæ yellowish, sometimes tinted with rosaceous basally, with the apical joints slightly embrowned; the first joint passing the apex of head, second, third and fourth joints subequal, fifth one third shorter; beneath paler, almost impunctate but transversely wrinkled. Rostrum reaching the middle of the third ventral segment, pale with apex infuscated. Pronotum concolorous, lateral margins straight, anteriorly finely serrate, narrowly yellowish, becoming ruby-red posteriorly, the humeri bright red, prominently acute but not spinose; the general paler surface is provided with coarse dark green punctures, appearing somewhat rugulose posteriorly; through the middle is a faint longitudinal ridge, evanescent through the rugulose portion; just within the lateral margins is a series of scattered black punctures which are sharply defined. Scutellum concolorous, coarsely punctate and rugulose on a pale background, throughout its length a pale median stripe becoming callosed posterior to the middle and sometimes tinted with red, apex narrow, callosed. Corium rather coarsely punctate, the punctures becoming finer and more closely set towards the apex, the costal margin in its basal half

yellowish, elevated; a small, round ruby red spot in the center of the corium opposite the apex of the scutellum. Membrane decolorous. Dorsum of abdomen shining pale green, faintly and irregularly wrinkled. Connexivum yellowish-green, outwardly narrowly margined with orange-yellow, a short transverse black fascia posteriorly before the incisures of segments 2-5 in the male and the apical angle of the 6th in the female also tipped with black. Sternum and venter paler yellowish-green, smooth, shining, with the pro- and meta-sternum coarsely punctate; apical angles of ventral segments 2-5 in the male, 2-6 in the female tipped with black; ventral furrow very evident, extended through to the sixth segment. Legs yellowish-green, with tips of tibiae and tarsi orange-yellow. Genital segment seen from below deeply and obtusely excavate and its posterior margins callosed. Length of ♂ and ♀ 19-20 mm. Width across humeri 9.5 mm.

Described from forty specimens collected by me in the Huachuca Mts., Arizona, July, 1905. In my remarks on the members of the genus *Chlorocoris*,¹ this is the species which I referred to as *C. rufopictus* Walker. Further study has shown that though it is closely related to that species it is evidently distinct. Besides being somewhat larger, in *flaviviridis* the lobes of the head are not of equal length but the middle lobe is shorter thus making the rounded apex appear incised, as depicted by Distant. The second joint is not longer than the third but subequal to it. The difference in coloration is quite distinctive.

Heræus coquilletti new species (Ms. name of Uhler).

Shining castaneous, glabrous. Head pale castaneous, elongate oval, impunctate but minutely, transversely wrinkled above and below; widely rounded behind the eyes and gradually narrowed to a short neck behind; tip of projecting tylus reaching the middle of the somewhat incrassate first joint of the antennæ. The antennæ are pale castaneous with apex of third and the fourth joint darker; second joint twice as long as the basal, third two thirds the length of the second and the fourth almost as long as the second joint. Rostrum pale, reaching to middle coxæ, apex of first joint just passing posterior line of the eyes. Pronotum shining, darker castaneous than the head, non-pubescent, with a distinct narrow collar; anterior lobe a trifle wider than long, almost impunctate; posterior lobe about two thirds as long and much wider than the anterior lobe and only slightly more elevated as seen from the side, coarsely punctate and provided with a faint median carina; humeri callosed, rounded, smooth, pale. Scutellum dark castaneous, coarsely punctate and posteriorly keeled, with acute, pale apex. Corium dark castaneous, non-pubescent with narrow costal margins and expanded spot before apex, paler; costal margins reflexed and somewhat concavely arcuated before the middle; clavus

¹ JOURN. N. Y. ENT. SOC., XVIII, pp. 35-36, 1910.

with a somewhat regular series of three rows of punctures, bounded by three other rows of subclaval punctures, the two outer rows anteriorly converging and not reaching the base of the corium; along the apical margin of corium is a single row of impressed punctures; the surface is more closely and irregularly punctured exterior to the middle vein and apically. Membrane smoky-brown, castaneous at base with four or five indistinct, basally sinuated nervures which are sometimes paler than the general surface. Pleural pieces dark shining castaneous, non-pubescent, for the most part coarsely punctate; surface near coxæ, margins and acute posterior angles of metasternum impunctate. Legs pale; coxæ, apices of the femora and of the tibiæ castaneous. The fore femora incrassate and armed beneath with two rows of spines, the inner row beginning a short distance before base with a few small teeth becoming more closely placed and a little longer on the apical half with two more enlarged teeth, one post median and the other a short distance beyond it; the outer row of teeth begins with a small median tooth and followed by the most prominent one of all, between this and apex are a number of small teeth. Venter shining castaneous, somewhat paler than the sternum, impunctate, transversely and minutely wrinkled and provided with a very few fine hairs posteriorly and on the genital segment which is infuscated. Length ♂ and ♀, 7 mm.

Described from two males and two females in the collection of Mr. Nathan Banks, from Stanford University, California, and a female in the collection of the Brooklyn Museum collected at Brownsville, Texas, by Mr. Carl Schaeffer. This latter specimen differs from the others in being paler and less shining.

Scolopocerus granulosis new species.

Color and form similar to *S. secundarius* Uhl. Dirty testaceous, roughly punctured and granulated and marked with fuscous. Narrow-ovate in shape. Head quadrate, roughly granulated, and provided with a few scattered blunt tubercles. Blunt apex of tylus extending slightly beyond the antenniferous tubercles. Lateral margins of head before eyes somewhat diverging to apex of blunt non-prominent antenniferous tubercles. Two short, black obliquely set spines behind each eye. The ocelli are placed about twice as far apart as they are removed from the eyes. Somewhat paler beneath, roughly granulated and punctured. Bucculæ about one half the length of the head. First joint of rostrum not reaching base of head. Apex of rostrum and sternal groove reaching only to middle of intermediate coxæ. First and second joints of the rostrum about equal in length, the fourth joint slightly longer than the third. First and fourth joint of the antennæ incrassate, the former roughly granular and concolorous with the head, the latter pyriform, black on granular hirsute basal half; second and third joints much more slender, of equal diameter but the second one third shorter than the third, fourth joint a trifle shorter than third, first and third subequal; apical half of fourth joint clothed with fine, closely appressed gray pubescence and provided with a few scattered longer hairs. Pronotum longer than wide, concolorous. Lateral margins almost

straight, granulate and provided with a few black blunt spines or tubercles. The whole surface roughly punctured and granulated, with a few scattered black tubercles. In the middle is an obsolete longitudinal pale ridge, evanescent anteriorly. Humeri not prominent, rounded. Scutellum roughly granular, surface somewhat infuscated with blunt apex, obsolete median ridge and sides anteriorly paler. Corium concolorous, with close set coarse punctures or pits between the prominently raised nervures which are mottled with fuscous. Lateral margins much arcuated. Tip of pale membrane not reaching apex of abdomen, not extended beyond middle of sixth abdominal segment, with numerous fine brownish irregular, branching, waving veins. Connexivum finely granulated, pale at the incisures, variegated with fuscous between. Sternum roughly punctured with a small, circular black spot in the middle of each of the sternal pieces. Venter finely punctured, variegated with fuscous, these punctures set with fine pale hairs, making the whole surface appear hirsute. Legs granulated and hirsute, variegated with fuscous, leaving a broad pale band near middle of all the tibiae. First segment of tarsi pale. Length of ♀, 7–8 mm.

Described from two females collected by Mr. Charles Schaeffer at Brownsville, Texas, for the Brooklyn Museum, where the type is now placed. This species is more closely related to *S. uhleri* Dist. from which it can readily be distinguished by its shorter hemelytra, the smaller terminal joint of the antennae, longer rostrum and its longer and narrower pronotum. From *S. secundarius* Uhl. it is at once separable by the difference in the fourth antennal joint which in that species is short and not as wide as the third joint.

SYNOPSIS OF SPECIES.

Fourth joint of antennae less than one half the length and not wider than the third joint *secundarius* Uhl.

Fourth joint of antennae much wider than the third joint.

Fourth joint of antennae pyriform; membrane of hemelytra not reaching apex of abdomen; pronotum much wider than long.... *granulosus* n. sp.

Fourth joint of antennae long, ovate, membrane of hemelytra reaching apex of abdomen; pronotum about as wide as long..... *uhleri* Dist.

Ceraleptus pacificus new species.

Closely related to *C. americanus* Stål., but smaller and less infuscated. Rusty yellowish gray in color. Head about as long as wide, generally somewhat infuscated and furnished with three, sometimes obsolete, stripes arranged as follows: a median one running from near base of head to apex of tylus and one on each side running from the base of head obliquely to the eyes, thence anteriorly, straight to the tip of the antenniferous tubercles. Lateral margins of head to tip of antenniferous tubercles either slightly converging or subparallel, not expanded anteriorly as in *americanus*. Apex of

antenniferous tubercles subacute, incurved. Distance between ocelli only a little greater than their respective distance from the eyes. Apex of head passing middle of basal joint of antennæ. Antennæ reddish brown, apex of third and all of fourth joint infuscated; all joints more or less hispid, particularly the third and base of fourth, the apical three fourths of fourth fine haired; the third joint gradually widening to apex, wider than the apical joint which is spindle-shaped; first and second joints subequal, the latter most slender, third slightly longer than second, fourth is a trifle shorter than second. Pronotum, with anterior margin nearly transverse, the anterior lateral angles not anteriorly produced; the lateral margins slightly concave, at least the anterior two thirds provided with small close set pale elongated tubercles, each armed at apex with a backwardly directed fine bristle; whole upper surface roughly punctured and more or less infuscated and generally finely tuberculate, at least in front; with a faint median ridge; humeral angle obtusely angled, slightly prominent. Scutellum concolorous, coarsely and roughly punctate, acute apex pale. Corium concolorous. Clavus with about three more or less regular rows of punctures; remainder with coarse setigerous punctures arranged somewhat in rows; veins elevated and faintly flecked with piceous; lateral edge of corium finely crenate. Membrane suffused with brown provided with a few irregular branching veins. Connexivum mottled with fuscous, a transverse pale fascia before the middle of each segment. Beneath paler, sternum coarsely punctate and variegated with piceous. Venter obsoletely wrinkled and mottled with fuscous, especially in front on both sides; sparingly clothed with fine appressed hairs set in fine punctures. Femora more or less mottled with fuscous; tibiæ paler and hispid; anterior femora unarmed; intermediate femora armed with a small spine before apex; posterior femora armed with a long slightly curved spine before apex, preceded by a short spine and followed by one or two short spines near apex. Length ♂ and ♀, 7-8 mm.

Described from three males, Dilley, Or. (my coll.); one male, Pullman, Wash. (Heidemmann Coll.); one male, Van Couver Island (Amer. Mus. Nat. Hist.); eight males, St. Cruz Beach, Calif. (Bradley—Cornell Univ. Coll.) one male, Olympia, Wash. (Kincaid—Cornell Univ. Coll.). Six females, Dilley, Or. (my coll.); one female, Tenino, Wash., one female, Lake Tahoe, Calif. (Heidemmann Coll.); two females, Van Couver Island (Amer. Mus. Nat. Hist.); six females, St. Cruz Beach, Calif. (Bradley—Cornell Univ. Coll.).

This species is closely related to and confused with *C. americanus* and in most collections it is so labelled. It may however be distinguished from that species by its uniformly smaller size and its color more red; the apex of tylus reaches just beyond the middle of the first segment of antennæ; the anterior angle of pronotum is not produced and the intermediate femora are armed with a single spine in place of the anterior pair as in *americanus*.

ORSILLACIS new genus (Ms. name of Uhler).

Closely related to *Belonochilus* Uhl. The head is less protracted anteriorly, being only a little longer than wide, the apex more blunt and only just surpassing the apex of the basal antennal joint. First joint of the rostrum as long as the head, the apex of which reaches just beyond the third ventral segment. The buccal groove is much more shallow and less pronounced posteriorly. Pronotum is wider than long. The slightly enlarged fore-femora are unarmed.

O. producta new species (Ms. name of Uhler).

Color rufo-testaceous, subshining, more or less infuscated and provided with very fine hairs. Head triangular, a little longer than wide, infuscated, very finely punctate; apex and base of head transversely and line within the eyes, expanded back of the ocelli; pale testaceous. Ocelli reddish, placed close to the eyes and just before an imaginary line drawn across the posterior margins of the eyes. Antenniferous tubercles fuscous, truncated and diverging, reaching about one third the way to the apex of the head; tylus bluntly protruding a little way beyond the apices of the lateral lobes. Antennæ with the basal joint slightly enlarged, short, pale; the remainder of the antennæ sordid testaceous and provided with fine pale hairs; second joint longest, slightly swollen at apex and nearly four times longer than basal joint; third joint two thirds the length of second; fourth joint almost subequal to the third and slightly incrassate. Head beneath testaceous obscurely punctate. Rostrum pale except at apex, first joint reaches base of head, second joint about one third longer, third joint over one third longer than second and the fourth a little shorter than second joint. Pronotum rufo-testaceous, obtusely impressed before the middle, obviously wider than long and coarsely punctured with fuscous, the region of the cicatrix and posterior margin smooth, the cicatrices making a broadly crescentic furrow widely scooped out behind this in the middle, a median pale ridge running from the anterior to disappear before the posterior margin where there is a transversely elevated ridge running between the slightly more elevated humeri. Scutellum more or less castaneous, transversely elevated at base, the lateral edge, median carina and apex pale yellow, the remainder of the surface depressed and coarsely punctate. The sternal pieces coarsely and irregularly punctured with castaneous, the region of the acetabulæ paler. Legs pale, the femora spotted with castaneous; the tibiæ embrowned; the slightly enlarged fore femora unarmed. The corium rufo-piceus, covered with depressed fine golden brown pubescence. Membrane smoky hyaline. Connexivum pale, with segments 2-6 banded with piceous anteriorly. Venter pale through the center, the surface laterally marked with bright red and piceus. Length 6 mm.

Described from two females from the Huachuca Mts., Arizona, one in the Brooklyn Museum and the other in my own collection.

Hesperophylum heidemanni Reut. and Popp. (Fam. Termatophylidae).

Reuter and Poppius described this recently from Mt. Washington in the collection of Mr. O. Heidemann. In the Brooklyn Museum is a single female specimen taken by Mr. Carl Schaeffer in the Huachuca Mts., Arizona, in 1905.

Doldina interjungens Bergr.

Dr. Bergroth's single female specimen of this Reduviid came from Roanoke Island, North Carolina. Mr. Nathan Banks has extended the known northwardly range of this species by finding a single male at Bay Ridge, Md., in July. In this specimen the scutellum is not at all recurved at apex. Otherwise it answers the description in all particulars.

Phymata acutangula Guér.

This species originally described from Cuba was later added to the fauna of South and Central America and Mexico by later authors but has not been known from the United States. In my collection is a single female specimen taken by Mr. O. Dietz at Brownsville, Texas. This specimen measures only 6 mm.

Stenomecra cliens Stål.

In a paper by me on "Some Mexican Hemiptera-Heteroptera New to the Fauna of the United States," JOURN. N. Y. ENT. SOC., Vol. XVIII, Mch., 1910, p. 37, I reported *S. marginella* H. Schf. as having been taken in the Huachuca Mts., Arizona. Since the publication of that paper I have received a quantity of material from Mexico, among which I find the true *S. marginella* H. Schf. My Arizona material must be referred to *S. cliens* Stål.

Tempyra biguttula Stål.

Described from Texas. Mr. W. L. McAtee has collected two specimens of this interesting little species on Plummer's Island in the vicinity of Washington, D. C. They were both taken in hibernation under sycamore bark.

Trapezonotus rufipes Stål.

I have two specimens of this species from Lakehurst, N. J., taken by sifting in March. So far as I have been able to learn it has not been reported from the eastern part of the United States before I recorded it in Smith's New Jersey List.

Aphleboderrhis pubescens Walk. (Fam. Aradidæ).

I have a single female specimen in my collection taken by Mr. O. Dietz at Brownsville, Tex., in June, 1901. I believe this is the first record of its appearance in the United States.

Corizus viridicatus Uhl.

Mr. Otto Heidemann has a specimen of this well-known western form taken in the vicinity of Washington, D. C.

Acanthocerus lobatus Burm.

Mr. Christian E. Olsen has presented me with a specimen of this species taken in New Mexico. I have carefully compared it with Cuban specimens and feel no doubt of its true identity. It must have reached New Mexico by way of Mexico but it has apparently escaped attention as yet from that country.

Heteroscelis lepida Stål.

I have a single male specimen of this pretty little species taken at Brownsville, Tex., in June, 1901, by Mr. O. Dietz. It is an addition to the fauna of the United States.

MISCELLANEOUS NOTES.

A Cricket New to Long Island, N. Y.—The country bordering Orient Bay near East Marion, Long Island, N. Y., is sandy in places with some pitch pines and tangle of catbriers that make protected retreats for insects and other wild creatures. Here on August 2, 1913, Mr. George P. Engelhardt and I collected a number of insects. In the course of our operations I turned over a log lying on the sand bordering the upbeach, and was surprised to see a little cricket that was evidently new to the known fauna of Long Island jump with much agility to a place of concealment. After a long hunt this cricket was captured and meanwhile Mr. Engelhardt had secured another. These insects proved to be well-grown nymphs of *Cycloptilum squamosum* Scudder.

In this JOURNAL, Vol. XVII, p. 187, December, 1909, *Cycloptilum squamosum* was reported from Lakehurst, N. J., where three males and three females were captured by the writer and Mr. Charles E. Sleight on October 3, 1909. The insect was originally described by

Scudder from a single male from Texas and a number of others have since been found in that state. I collected mature individuals at Lakeland, Fla., in May, 1912. It has also been found according to Rehn and Hebard in their revision of the genus¹ in Maryland (Pergande), North Carolina (Brimley and R. & H.), Georgia (Allard and R. & H.), Arizona (R. & H.), California, Colorado and Nebraska (H.).

The discovery of the species near Orient extends its known distributions on the Atlantic coast much to the north, and adds another example to the interesting insects that have been found on Long Island.—WM. T. DAVIS.

Coleoptera Found with Lepidopterous Borers.—Mr. Henry Bird has found the following coleoptera in the course of his searches for lepidopterous borers: *Conotrachelus anaglypticus*, stem of the fern *Woodwardia*, Lakehurst, N. J., August 20, 1913; *Sphenophorus aequalis*, bred from the sedge *Spartina*, Rye, N. Y., July 21; *Ligyris retusus*, boring wildrice, Wilmington, Del., July 16, 1909.—C. W. LENG.

On Cioidæ.—The beetles composing this family are small elongate rounded insects that range in length from one to about three to five mm. They are mostly of dull black or brownish colors, though a few have red or yellow elytral maculation. Many of the species have vestiture of hairs or bristles. A few however are glabrous. So far as known none of the North American species have well marked elytral striæ. The antennal joints vary in number from eight to ten. The last three (two in *Maphoca*) joints form a rather loosely jointed club. The antennæ are inserted at the anterior margin of the eyes. Tarsi four-jointed. Prothorax has lateral margin and is more or less prolonged at apex over the head. Claws of tarsi simple. Ventral segments five in number. Secondary sexual characters of males in some of the species are quite remarkable. The margin of epistoma is more or less reflexed with teeth or processes of edge. The apex of prothorax in some males being prolonged into horns or processes of various shapes and length. The first ventral segment in some species has a strong fovea at middle. The species live in fungus of the tough woody polyporoid kinds which they and their larvæ devour.

¹ Proceedings Acad. Nat. Sciences of Phil., June, 1912.

Here at Cincinnati, Ohio, they seem to be on the job all the year around. By crumbling the fungus into a sifting net and sifting the debris over paper, arranging it so the warm sun will shine on the paper and cause the insects to move, they can be picked out. Bunches of fungus can be gathered in woods at any time and carried home in paper bags, placed in a suitable degree of temperature and moisture, and the beetles will hatch and begin feeding. They are frequently very numerous in individuals. From the fungus I found growing on a large log (poplar) which I crumbled and broke into small pieces and sifted, I gathered over 1,000 specimens of nine species viz.: Two of *Cis*, two *Xestocis*, two *Ceracis*, one *Ennearthron*, one *Octotemnus* and one new genus. This patch of fungus would have yielded perhaps 5,000 if so many had been wanted. To study the little organisms they should be clean and have antenna and foreleg drawn out and a few males mounted ventral side up. It is necessary to examine them with a compound microscope to count antennal joints, etc., with accuracy. The Cioidæ are often confused with some of the Scolytidæ, but the characters given will enable them to be recognized. There are other more minute characters, some of them of great value, but they are difficult to see. In the above definition, I have excluded the Rhipidandrinæ which form a tribe in the family Tenebrionidæ. I cannot find any evidence of their being of any economic importance. In the botanical museum of the Lloyd's in the department of mycology they eat up the specimens of *Polyporus*, and allied fungi, if the specimens have not been first baked or poisoned before placing them in the collection. I have heard the curator make remarks decidedly uncomplimentary to the whole beetle tribe in this respect.—CHAS. DURY.

Reactions of the Spider, *Pholcus phalangioides*.—During a ten months' cruise in a New Bedford whaling vessel, which sailed from Barbados, W. I., as far south as the latitude of Cape Horn, the writer observed that numerous long-legged spiders, specimens of which have since been identified by Mr. James H. Emerton as the widely distributed house spider, *Pholcus phalangioides*, were constant inmates of the ship's cabin. They occupied rather shapeless webs in shelves and low corners. Their food supply was a mystery, since the only flying insects ever seen on the vessel were minute Diptera brought on board with fruit at the Cape Verde Islands and at Fer-

nando Noronha. Nevertheless, even a four months' stay in the icy fiords of South Georgia Island, in latitude 55° South, did not eliminate the spiders, for they became active again as soon as we encountered warm weather on the return voyage.

The curious "whirling" defence of this species of spider is well known. When disturbed the animal rotates its body upon its legs, keeping the tips of the tarsi close together upon the web, while the legs are pulled out straight by centrifugal force and the rapid circling conceals the spider in a blur.

During the last week of August, 1912, when the vessel had been about two months out of port, I made a series of experiments upon the spiders in the cabin in order to determine their reaction to stimuli of touch, wind, odor, light, etc., and the duration and reiteration of the "whirling defense." The averages of the reactions are as follows:

1. The whirling response was made to tactile stimuli, that is whenever the body of the spider was actually touched with a hair, however lightly, or the web shaken.

2. The whirling response was not made to violent blowing of the breath on the spider, to the close juxtaposition of a finger or stick, to the odor of strong alcohol, nor to sunlight flashed from a mirror. If these stimuli were continued, however, the spider would finally drop from the web and retreat to a hiding place.

3. In the whirling response the first reaction to the touch stimulus was of brief duration, the spider soon slowing down, and coming to rest within 15 seconds.

4. The second and third responses were increasingly violent and of longer duration.

5. The third or fourth response (usually the latter), marked the maximum, the whirling lasting from 2 minutes and 15 seconds to 3 minutes.

6. After the third or fourth stimulus the jerky, feeble response indicated fatigue. The whirlings became shorter and slower, and disturbance continued seven or eight times always resulted in the spider dropping from the web and retreating.—ROBERT CUSHMAN MURPHY.

JOHN ARTHUR GROSSBECK

Born February 2, 1883; Died April 8, 1914.

All entomologists will join with their fellow members of the New York Entomological Society in their sorrow at the death of Mr. Grossbeck. Although his chief interest was in the Geometridæ, his entomological activities were so general that his name was familiar to many who had not been fortunate enough to know him personally. For several years he had been an assistant in the American Museum of Natural History where he applied himself with his characteristic industry and zeal to whatever needed to be done, even at a sacrifice to his specialty. He leaves a large mass of unpublished manuscript including a practically completed paper on the Lepidoptera of Florida. For some months before his death he had been suffering from a severe attack of diabetes and, accompanied by his brother, sailed on March 18 for an extended Caribbean trip in the hope that it would benefit his health. Unfortunately, it did not have the desired effect and he died a few weeks later while at Barbados. A more extended account of his scientific work will be published in a future number of the JOURNAL.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF FEBRUARY 3.

A regular meeting of the New York Entomological Society was held February 3, 1914, at 8:15 P. M., in the American Museum of Natural History, Vice-President H. G. Barber in the chair, with twenty-two members and five visitors, including Dr. E. A. Chapman and Mr. J. A. Weber of the Linnean Society, present.

Dr. Philip Dowell, of Port Richmond, N. Y., was proposed for active membership by Mr. Davis and, the by-laws being suspended for the purpose, was immediately elected.

Mrs. Annie Trumbull Slosson, through Mr. Davis, communicated a press notice of the meeting, in which the Coleoptera to be discussed appeared as Cleopatra.

Mr. Leng read a paper on "Collecting Insects in Cuba" referring especially to the Coleoptera collected on his recent visit to the island with Dr. Lutz.

Mr. Groth exhibited his collection of the Papilios of Cuba, commenting on the comparative rarity of males. The species shown were:

Papilio columbus H. Sch.

devilliers H. Sch.

polydamas Linn.

thoas oviedo Gundl.

pelans Fabr.

orynius Hübn.

Papilio celadon Lucas.

caiguanabus Poey.

aristodemus Esper.

andremón Hübn.

androgeus Cram.

Dr. Lutz exhibited with the radiopticon, about 75 photographs and pictures of Cuban scenes, describing his visits to Guana, Zaza del Medio and Santiago, confirming what had been said as to three sections of Cuba. He dwelt particularly upon his visit to Guantanamo, where he was fortunate in meeting Mr. Charles T. Ramsden, the principal living Cuban entomologist, and with his guidance was able to collect in the tropical jungle of the eastern end of the island.

Mr. Davis presented portraits of Dr. Henry Skinner to the Society's collection.

During the service of refreshments, Mr. Weeks entertained the Society with newspaper articles on entomological matters, and exhibited part of his collection of *Oodes* and other Carabidæ obtained years ago at the foot of the Palisades, a locality Mr. Weeks said which was now much altered, so that the best place for such species was probably the border of the marshes on the south shore of Long Island.

MEETING OF FEBRUARY 18.

A regular meeting of the New York Entomological Society was held February 17, 1914, at 8:15 P. M., in the American Museum of Natural History, President Raymond C. Osburn in the chair, and ten members present.

Mr. Barber read a paper on "Some Interesting Results of Collecting Hemiptera in Virginia" in which he referred to the light thrown upon insect distribution by his collections in 1911 near Herndon, and in 1913 near Vienna, about 12 miles west of Washington, D. C., where he found a rolling sandy truck farming country with patches of deciduous and of coniferous forest, not differing greatly from southern New Jersey.

This region seems to be the southernmost limit for many boreal species and equally the northernmost limit for some austral species, while a few western species also reach it, perhaps via the Cumberland Gap and the Potomac River. After giving instances of each class, Mr. Barber described the three avenues of dispersal for Sonoran insects as outlined by Webster and referred particularly to the path via the Gulf States, and thence east of the Great Fault by which such species have reached the Atlantic coast, dwelling especially on the Harlequin Cabbage Bug (*Murgantia histrionica*) which with Mr. McAtlee he had found abundant at Chesapeake Beach on a wild cruciferous plant. There also he had found many species by pulling up the grasses that grew above high tide mark and shaking the roots over a cloth.

Reviewing the principal species that were captured during the two summers, Mr. Barber pointed out repeatedly that often they were austral species found here rarely if at all; and that the abundance of certain groups had led to the Washington entomologists giving those groups special attention, as Nathan Banks has done in *Emesa* and Mr. Heideman in the Tingidæ.

The paper was discussed by Messrs. Comstock, Davis, Leng and Dr. Osburn, the latter recalling that about 20 years ago the harlequin bug was abundant in Central Ohio, but for two years only, a severe winter apparently preventing its becoming a permanent resident, as it is in southern Ohio and Indiana.

Mr. Davis showed by Smith's List, page 136, that only in 1896 has this insect ever reached destructive numbers in New Jersey.

Mr. Davis exhibited a southern cricket, *Cycloptilum squamosum* Scudder, which he had found on Long Island, and read a memorandum relating thereto which will be printed in Short Notes. He also exhibited a pamphlet on Friendly Insects of Australia, and one issued by the South African Central Locust Bureau, in which it was stated that brown locust eggs hatched after 3½ years' retention, a period that might be exceeded if the eggs had lain undisturbed in the soil.

Mr. Leng read a note from Mr. Norman S. Easton, describing the locality in which he had found *Canthydrus puncticollis*, on submerged lumber in slowly moving swamps, see page —; also one from Charles Dury, in reference to *Cioida*, which will be found in Short Notes; and a letter from Dr. W. E. Britton, in reference to *Coccinellida* being possibly double brooded.

Mr. Davis said that *Axion tripustulatum*, which is abundant at Lakehurst on *Kermes* infested oaks in July and August, was probably single brooded, as it was rarely found at other seasons.

Mr. Comstock referred to *Liphya brassolia* and read a passage from Dr. Wheeler's work on ants relating thereto.

Mr. Dow spoke of the attractiveness of Joe Py weed when in bloom, for insects, especially *Trichodes* and *Amphicoma*.

MEETING OF MARCH 3.

A regular meeting of the New York Entomological Society was held March 3, 1914, at 8:15 P. M., in the American Museum of Natural History, President Raymond C. Osburn in the chair, and fourteen members present.

Dr. Osburn, under the title of "Remarks on *Penthesilia* and some related Syrphid genera" exhibited his collection and spoke at length of the taxonomy of these flies with frequent reference to the larval life.

Messrs. Davis, Woodruff and Schaeffer discussed this paper, especially in reference to the early appearance of *Penthesilia verbosa* on willow blooms, which, while well known, was in this vicinity not frequent; Dr. Osburn added that as a matter of fact, most of his specimens of this species had been donated by loving friends.

Mr. Dow under the title of "About Boisduval" gave an interesting picture of the life and entomological activity of Jean Baptiste Alphonse Dechauffour de Boisduval, born 1799, died 1879, a physician, once curator of the Dejean collection, author of many works on Lepidoptera and Coleoptera, including his joint work with the elder Leconte on the Butterflies of America, in which appear the drawings and ecological notes of John Abbot, of Georgia. After the retirement of Dejean, Dr. Boisduval, who came of a land-owning Norman family, devoted himself to medicine, but accumulated a great collection as well, in which were included the Californian insects collected by Lorquin, and became the highest authority on identification of butterflies. His collection passed into the possession of Charles Oberthür, and after three-quarters of a century of life, the aged doctor retired to the home estate at Ticheville, there perhaps to watch, as Mr. Dow suggested, his grand-children, the trees, the sky and the butterflies that pass uncaught "when it's apple blossom time in Normandy." His death notice in the *Annales* of the Entomological Society of France is by Charles Oberthür and leaves no salient facts to be added.

Mr. Comstock read a paper on "The Californian *Lycanida* described by Boisduval," which will be printed in the JOURNAL, exhibiting his collection and the recent work by Oberthür in which the Boisduval types are figured in colors, as well as the earlier publications on the group. In the course of his remarks he referred to the assistance of Mr. Watson and his concurrence in the synonymy proposed.

The paper was discussed by Messrs. Davis, Woodruff, Watson, Schaeffer and Dr. Osburn, and Mr. Comstock's opinion as to the various names for our own little blue butterfly asked.

Mr. Comstock said *Cyaniris ladon* was surely its specific name, but the standing of the names *marginata*, *lucia*, *violacea*, for its seasonal forms was still in dispute; some collectors holding that each of these represents a distinct succession of Spring forms appearing about ten days apart, others that *marginata* and *lucia* cannot be separated, others that *violacea* also is inseparably connected by intergrades; all however agree in calling the summer brood in which the spots are almost obsolete, *neglecta*. Mr. Comstock said that the spring larvæ feed on the developing flower buds of benzoin, wild cherry, viburnum, etc., and are difficult to raise, though W. H. Edwards had succeeded in doing so. The summer form, *neglecta*, feeds on *Ceanothus*. He added that the number of broods probably varied in different seasons, the allied species *comyntas* having certainly four broods in some seasons. Further south the succession of spring forms differs from that observed near New York, and *pseudargiolus* becomes a predominant form at certain seasons.

Mr. Davis spoke of the similar difference observed in spring form of luna moth.

Mr. Leng exhibited specimens of *Arthromacra anea* and a different species of the same genus collected by Col. Wirt Robinson, in Nelson Co., Va., and communicated by him in which a bright green color was accompanied by difference in pronotal punctuation, and relative length of antennal joints, as pointed out by Col. Robinson, who also noticed that there was no commingling of the two forms in copulation.

Mr. Davis exhibited photographs of Philadelphia Academy of Sciences, and spoke of his kindly reception at a recent meeting of the entomological section and at a meeting of the Feltman Collecting Social, which he had also attended, expressing his admiration for the great work being accomplished in that city by a comparatively small number of men. He said this was doubtless aided by the magnificent library and the facilities for its use, each member being provided with a key so that he can work undisturbed at evening.

Mr. Angell spoke of the metallic colors in *Coptolabrus*, and the crimson hue that was caused by water being applied to the elytral surface, as he discovered in relaxing and remounting, affording another illustration of the mechanical character of the colors.

MEETING OF MARCH 17.

A regular meeting of the New York Entomological Society was held March 17, 1914, at 8:15 P. M., in the American Museum of Natural History, Mr. G. W. J. Angell in the chair and seventeen members present.

Mr. Davis under the title "Remarks on Some Orthoptera from the East Coast of Florida" showed his extensive collection of Floridian Orthoptera and a large number of photographs thrown on the screen by radiopticon. Mr. Davis said that 92 species were taken by Mr. Sleight and himself on their recent visit to the East Coast, and 104 species had been taken on his several

Florida trips. Some of these are new to science, especially among the *Beloecephalus* inhabiting the Keys. The insects of this genus cannot fly nor can they travel about very well on account of their clumsy bodies, so they become liable to the influence of isolation, and specific differences can well arise every few hundred miles. Mr. Davis showed by figures the differences in subgenital plates, etc., by which the species are separated. He spoke also of an acrid fluid expelled by one species of walking stick similar to condensed milk in appearance; of an earwig found taking care of her numerous young in her cell; of the Big Lubber Grasshopper, of *Aptenopedes aptera* Scudder chewing half moon holes in scrub palmetto, and of the katydid first described by Beutenmuller, and its song. He described the method of "shining the road" at night as specially productive at Miami, where a road ran through the big hammock and where Mr. Sleight caught *Phrixa maya* (described from Yucatan) for the first time in the United States.

Mr. Mutchler spoke of "Some of the Museum Collections" exhibiting types additional to those already reported, and the system of arrangement of the drawers. He also showed a new species of *Criocephalus* from Cuba.

Mr. Dow gave an "Exhibition of Early Entomological Books" showing the works of Ray, Reaumur, Geoffroy and others, and commenting on the state of the science previous to the time of Linné, spoke particularly of the remarkable work in dissection and drawing of some early Italian authors.

MEETING OF APRIL 7.

A regular meeting of the New York Entomological Society was held April 7, 1914, at 8:15 P. M., in the American Museum of Natural History, President Dr. Raymond C. Osburn in the chair, and seventeen members present.

Mr. Leng read a paper on "West Indian Coleoptera" in which after reciting the methods employed in compiling the list he showed on the black-board the following comparison of the total number of species recorded in the principal families from the West Indies and from New Jersey, viz.:

	West Indies.	New Jersey.
Rhynchophora	590	429
Chrysomelidae	364	271
Cerambycidae	243	197
Scarabæidae	182	163
Tenebrionidae	134	65
Elateridae	123	129
Staphylinidae	146	257
Carabidae	113	357
Silphidae	0	34
Total, including smaller families	2,900	3,042

exhibiting as salient features of the fauna, a comparative wealth in phytophagous species contrasted with a comparative poverty in carnivorous species

and coupled with a development in Tenebrionidæ, more like that of the Sonoran region than that of the Atlantic coast. The total absence of the carrion eating Silphidæ is apparently well established, as well as a characteristic development of certain genera and tribes, like *Leucocera* in the Chrysomelidæ, Exophtalmi in the Rhynchophora and Solenopterini in the Longicornia.

Mr. Leng said the data were insufficient to attempt any comparison with the fauna of South and Central America, beyond the evident intimate relation between that of the islands and the continent and the comparative paucity of species on the islands. In reference to Florida he spoke of the West Indian colony in southern Florida and the existence of boreal forms like *Chlanius niger* in Florida and Cuba, the presence of which might be accounted for if one might assume a former land connection between the two regions.

Mr. Leng also called attention to the changes in family names, necessary to accord with the most recent catalogues, viz.:

Cicindelidæ become part of	Carabidæ
Trichopterygidæ change to	Ptilidæ
Mycetophagidæ change to	Tritomidæ
Trogositidæ change to	Temnochilidæ ¹
Parnidæ change to	Dryopidæ
Dascyllidæ part change to	Dascillidæ
Dascyllidæ part change to	Helodidæ
Elateridæ part change to	Eucnemidæ ²
Throscidæ change to	Trixagidæ
Lampyridæ split into	Lycidæ, Lampyridæ, Telephoridæ
Ptinidæ split into	Ptinidæ, Bostrichidæ
Lucanidæ split into	Lucanidæ, ³ Passalidæ
Cistelidæ change to	Alleeulidæ
Anthicidæ split into	Pedilidæ, Anthicidæ, Hylophilidæ
Calandridæ change to	Cossonidæ
Scolytidæ split into	Platypodidæ, Ipidæ

and said that he hoped to discuss the reasons advanced for each change at a later meeting.

These remarks were discussed by Dr. Osburn and Dr. Lutz, the former calling attention to the great depth of water in the Florida Straits, the latter vigorously combatting the possibility of such a land connection, as lacking support from palæontology, geology, botany or any other science. The evidence he said was strong that West Indian distribution between the islands and from the mainland had been a matter of sea-drift, winds, hurricanes and

¹ The name Ostomidæ is preferred by some authors.

² The Elateridæ have been subjected to further subdivisions, in part, perhaps, still open to discussion.

³ The Lucanidæ and Passalidæ are by some authors treated as sub-families of Scarabæidæ, which is then split into a number of sub-families.

particularly natural rafts operating through long geologic time; and the paucity of mammalia was finally a killing argument against a purely theoretical land connection.

Mr. Leng recalled in support of the drift and hurricane theory the fact that specific identity between Floridian and Cuban forms was in fact largely found in the seashore and strong flying insects.

In reference to the relation between West Indian and Yucatan insects. Dr. Lutz cited tables he had prepared from the Petrunkevitch catalogue of Spiders showing only 4 5/10 per cent. of the genera as common to the two regions.

Mr. Harris said he could add to the data on Cicindelidæ, *Tetracha* sp. and *Cicindela trifasciata* from Grand Cayman.

The secretary read a letter from Col. Wirt Robinson pointing out an error in Blatchley's Coleoptera of Indiana requiring the change on page 989 under "a" and "aa" in the synoptic table of *Cyclocephala*, of the words "outer" to "inner."

The secretary also read a letter from Mr. Davis reporting on the experiences of Mr. Barber and himself near Wilmington, N. C.

Mr. Angell stated that he had in his collection a specimen of *Cychrus* (*Spharoderus*) *lecontei* from Franktown, Nev., collected by S. W. Denton. He also called attention to an opportunity to obtain fine series of *Desmocerus auripennis* from Chas. Dury; the specimens having been recently collected by Pilate.

Dr. Lutz spoke of Mr. Grossbeck's journey, at present in progress, through the West Indian islands.

Dr. Love and Professor Bradley also spoke briefly.

MEETING OF APRIL 21.

A regular meeting of the New York Entomological Society was held April 21, 1914, at 8:15 P. M., in the American Museum of Natural History, President Dr. Raymond C. Osburn in the chair, with fifteen members and one visitor present.

Mr. Hall exhibited butterflies caught in the Black Mountains, N. C., in June, 1912, with photographs of the region, which was elevated about 2,300 feet above the sea. He commented on the small number of diurnals, 29 species in all, and spoke of the construction of a logging railroad, from Black Mt. Station into the mountains, which will facilitate collecting in future.

This paper was discussed by Messrs. Schaeffer, Davis, Engelhardt and Leng, all of whom had had some experience in the southern mountains, and it was suggested that it was necessary to collect in varied environments to secure many species, and especially along the summits of the ridges, often more open than their flanks, for butterflies.

Mr. Harris made an "Exhibition of Exotic Genera of Cicindelidæ" showing representations of the tribe Ctenostomini from Madagascar and South America; of the tribe Collyrini from India, China and the Pacific islands;

of the tribe Theratini from the same area, of the tribe Cicindelini, in its oriental subtribes, from New Caledonia, New Holland, Australia, South Asia, Africa, Java and Borneo, of the tribe Megacephalini (to which belongs our *Tetracha*), from Africa; of the tribes Mantichorini and Platychilini from southern Africa. In connection with *Tetracha*, Mr. Harris announced that the species from Everglade, Fla., made known by Mr. Davis, had been identified by Dr. Walther Horn as *T. chevrolati* Chd., never before reported outside of Yucatan.

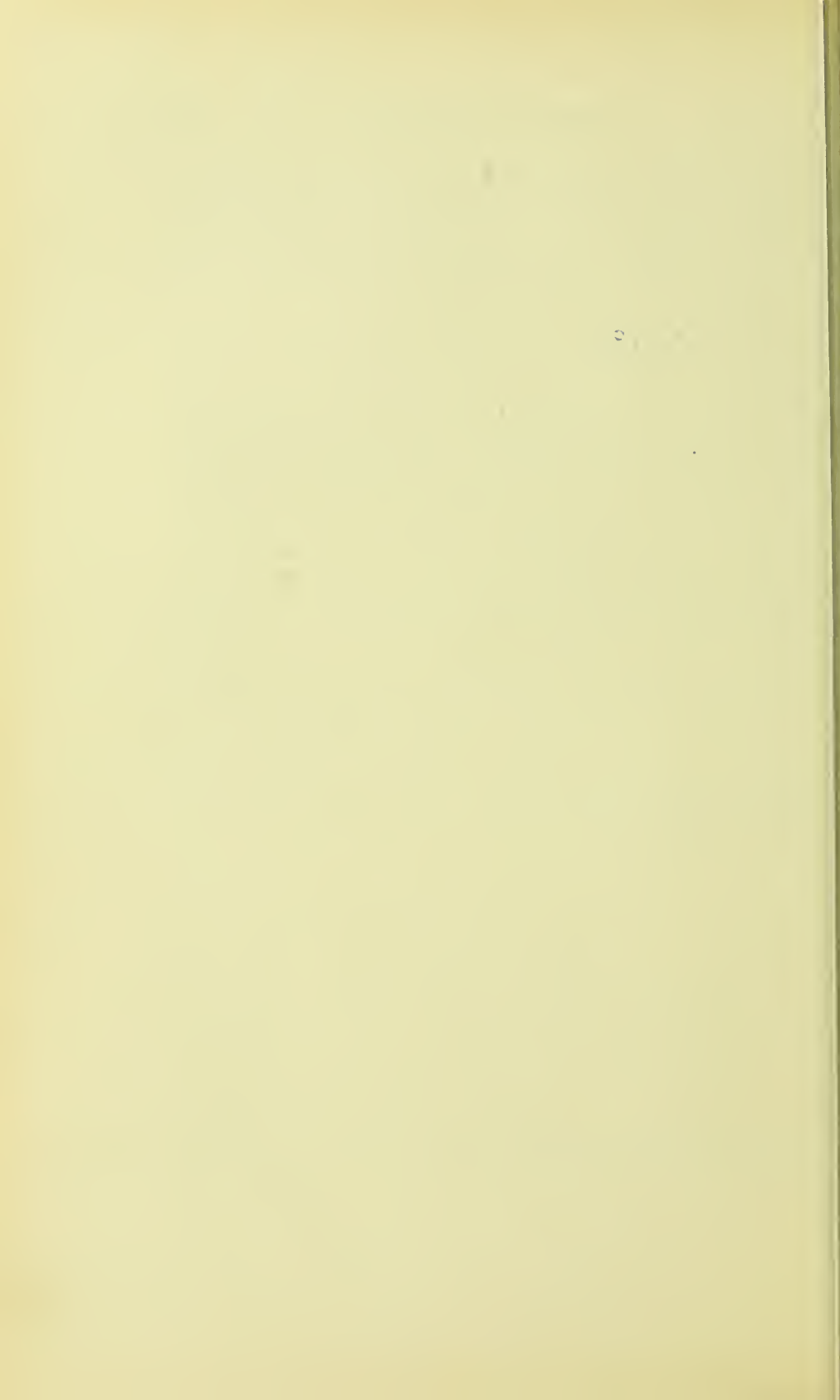
Mr. Davis said that he had not personally collected the specimens, which were sent to him after his return to New York by the sons of his host at Everglade, Mr. Storter; May, June and July appeared to be their season. This occurrence of a Central American species in southern Florida was paralleled, Mr. Davis said, by the previously recorded capture by Mr. Sleight at Miami of *Phrixia maya*, and possibly by his own capture at Lake Okechobee of a longicorn beetle, *Dorcasta obtusa*, a member of a genus known to occur in Cuba, but more developed in Central America, whence several species have been described.

Mr. Dow read a paper entitled "A Bit of Classification in the Making" in which a letter from Dr. Sharp to Dr. Leconte in reference to the Haliplidæ and other groups was included.

Mr. Dow also spoke of *Phytonomus alfalfa* coming from Dr. Titus, in Utah, and distributed specimens; he also recorded *Malachius æneus* collected by A. B. Champlain near New Haven, Conn.

Mr. Leng called attention to *Gyascutus carolinensis* as recorded from Harbor Island, Bahamas, in C. C. Nutting's "Bahama Expedition" the capture and identification being credited to Professor Wickham.

Mr. Schaeffer said the original description of this species from North Carolina was simply an error, due to the first specimens having reached Dr. Horn in a bottle with Carolinian insects. Subsequent captures have shown its actual habitat to be Sonoran.



THE NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except June, July, August and September) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

Annual dues for Active Members, \$3.00.

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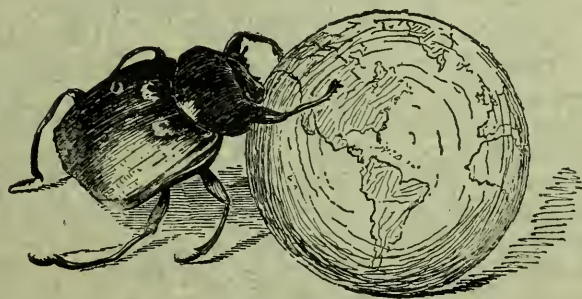
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JOURNAL

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SEPTEMBER, 1914.

No. 3.

THE GREATEST COLEOPTERIST.

By R. P. Dow,

BROOKLYN, N. Y.

Of all the papers dealing with American Coleopterology far the most important is probably that listed as No. 3 in Henshaw's Bibliography of Leconte, published in the Boston Journal of Natural History, Vol. V, pp. 203-209, and entitled: "Descriptions of Some New and Interesting Insects Inhabiting the United States. By John L. Leconte. Read before the Boston Soc. Nat. Hist., November 6, 1844." It is, in fact, in matters entomological the American Declaration of Independence. Previously scattering species had been recorded by Harris, Ziegler, Hentz, Randall, Leconte, the elder, and during a few years one Thomas Say had violated all precedent by describing his own discoveries without reference to Europe, about 800 species of beetles and rather more in other orders, but this revolutionist had died young after nine years of unhappy expatriation in the wilderness of Indiana, where literature was not. Following his departure the science languished, utterly neglected in New York and Philadelphia, kept alive by a small band in Boston and a handful of local collectors scattered over the country.

One would like to imagine that this paper met with the reception it deserved, that to the faithful score of those who might attend Dr. Harris had passed around the word that a paper, quite out of the ordinary, would be presented, and that the author, a son of his old friend, Major Leconte, a recent graduate of St. Mary's College was

really of even greater promise than Harris' own pupil, John W. Randall, of seven years before. Thomas Wentworth Higginson was then a beginner. Present also should be Copley Greene, a local collector, who had taken the then unusual trip to Paris, taking all his beetles with him, reveling for weeks in the Dejean collection, comparing and labeling his own, and even exchanging with that prince of amateurs. One easily imagines Leconte, the elder, the Major, still possessing a soldier's bearing. He had begun his visits to Cambridge and Dr. Harris in 1830 and had read before this very society his paper monographing the Histers. He had inveighed eloquently against the carelessness of American describers in not studying sufficiently the earlier authorities and thus burdening the synonymy. As luck would have it, the first six species described in that paper proved synonyms. One would like to imagine the debut of young Leconte as a speaker. An inspection of the minutes, however, of the Boston Society of Natural History of that date shows that it was a very ordinary meeting. Neither Leconte was present. The paper was read "by title" and ordered printed. The gem had no setting.

Before entering upon his detailed descriptions young Leconte wrote:

"The indolence of our entomological observers is the more deplorable, as we are few in number, and therefore more is to be expected from each individual. The field of research is still open, and anyone who travels in it, with even ordinary care and attention, will not fail, under the numerous stones scattered on its surface, and the weeds which apparently obstruct his path, to discover as fine insects as have ever graced the cabinet of a Hope or a Dejean. I trust that the day is past when our insects must be sent to Europe for determination. Are we to be bound by the mere dictum of some European entomologist, of equal indolence with ourselves, who chooses to *name* the insect which we have discovered? Where should our insects be better known than in the country which gave them birth; but in what civilized land are they less studied?

"These remarks may appear rather high-flown to one who is not interested in the subject; but I trust I may be pardoned for this outburst of feeling . . . when I see—what shall I say shiploads?—of our finest insects sent off to Europe, with no authority but a cabinet name, or perhaps not even with that, until some person of more than

ordinary industry, into whose hands they chance to fall, describes them, and acquires great praise for doing that which he ought not to have a chance of doing. Can it be wondered at that there is so much confusion about the synonymy of our species, when they are published in every country of the globe, but that in which they ought to be published?"

The presumptuousness of this interpolation is not what is expected from a youth of nineteen. It is a challenge, the outcome of which can only be ridiculous failure or preëminent success. Neither is the vigorous, trained use of language the usual accompaniment of the student period of life. In our day of too extreme, too early specialization the curriculum of elementals is unduly neglected. Balanced, forceful, faultless English is rare and nowhere rarer than in science.

From the date of his first paper thirty-nine years of life were given to John Lawrence Leconte, four of which were devoted to his country and four more to an invalid wife, eight in all during which entomology occupied only odd hours. When he began there were not five genuine entomologists in the country. The president of the Philadelphia Academy of Sciences wrote in 1842 that "there is not one entomologist in our number." When Leconte finished Philadelphia was the home of the science. Leconte described 4,734 species of beetles, nine times as many as any predecessor. Many dropped into the synonymy, but present research is restoring them constantly, notably among those which he himself suppressed.¹ He, with a pupil, gave to the world a division of the Rhynchophora in which every basic fact was a new discovery. To crown all, in the last year of his life he and that pupil produced a generic classification of the Coleoptera which superseded every European work and which, while out of print, is far from obsolete. Modern science is arriving at its major classification by a different route, but arriving at substantially the same conclusions. Moreover, by Leconte's example and direct influence entomological societies sprang up all over the land. He was a man of enormous power of attraction, few jealousies and fewer enemies.

John Lawrence Leconte was born in New York City, May 13, 1825. The Lecontes were a Huguenot family, as were the Says and Chaudoirs, who contributed immortal names to coleopterology. They

¹ Compare Thos. L. Casey Memoirs IV, p. 220, sub *Brachysomida*.

had prominence and wealth before they were driven from France in the seventeenth century. They lost nothing in the New World, either in the sugar trade in Martinique or in the great family plantation in Liberty County, Georgia, until the latter was despoiled during the Civil War. Their marriages were as a rule with families of prominence. The grandfather of Dr. Leconte married a Miss Eatton, of the family which founded Eatontown, N. J. Hence his father's name, John Eatton Leconte. Major Leconte entered the army from pride, not necessity, and retired long before he was forty. He was thirty-seven when he married Miss Lawrence and settled in New York City. The two first born of this marriage died in infancy. His wife dying, Major Leconte was left to the solaces of a life-long passionate devotion to natural history and the care of his third son, then only a few months old. For thirty years the major lived in New York. Day after day he worked over his beetles with a little toddler on his knee. If environment is to count the youngster was bound to be a coleopterist.

There is in Philadelphia a family of beetle collectors, the grandfather a contemporary of Leconte, the father now owning the best private cabinet in that city, and the son an enthusiast, home several times with the spoils of Texas and the far Southwest. I asked this young man: "Do you remember a time when some common but handsome species here was new to you and the capture of which gave you a thrill—something like a *Prionus laticollis* or the velvet green *Chlenius sericeus* or the big purple *Dicelus*?" He shook his head. No, he knew all those species by the time when boys of his age were becoming certain of the sequence of letters in the alphabet. He knew the number of tarsal joints when his fellows were learning to interpret the hands on the clock face. So with young Leconte. He absorbed beetle knowledge with his primer. He mingled new species with long division.

He was graduated from St. Mary's College, Maryland, in 1842, then studied in the College of Physicians and Surgeons, New York, taking his degree of M.D. in 1846. He never practiced prior to 1861. How he got his degree in 1846 is hard to understand. He made a journey to the Far West in 1843. In 1844 he visited Lake Superior, working his way along the entire south shore and crossing the country to the sources of the Mississippi River, and this trip was

soon repeated. In 1845 he went up the Platte River to Fort Laramie, thence to the foot of the Rocky Mountains, and back to civilization by the Arkansas River. He followed the Santa Fé trail to New Mexico to turn up once more the insects known only from Say's descriptions of his own types. There was little time left for the study of medicine.

It will be observed that young Dr. Leconte was free from the encumbrance placed upon ninety-nine per cent. of mankind—the necessity of earning his own living. The fact is that two lives, those of father and son, are serial, bound together in a single aim in a way almost unprecedented. Somewhere in George Eliot's works there is described a meeting of an incoming and an outgoing clergyman. The elder observes sadly: "You do not begin where I leave off; you must begin where I began." It was the major's aim that the boy should not begin where the father began. To begin where he left off was not to be hoped for, but many years of hard study could be saved. A man of simple tastes, the major economized that the boy should never lack time and independence. Of scholarly tastes, the major was determined that the boy should have the broadest foundation of general knowledge. With military simplicity the major packed the boy's valise and bade him Godspeed on every journey. When the boy sent back 10,000 beetles in alcohol from San Francisco the major received them at home, mounted them, identified all he could, gazed at all under the lens and jotted down the characters which seemed to be important. All to save time when Johnny came marching home, all to lengthen out the working hours of a human span, all that his own career in the science should be extended and glorified by the second generation.

In 1852 the Lecontes moved to Philadelphia. Thither had come Prof. S. S. Haldeman from Lancaster to the University of Pennsylvania. They would be nearer to Dr. Friederich E. Melsheimer, who had become president of the Entomological Society of Pennsylvania, formed in 1842. The Melsheimer checklist was to be edited and brought to date for the Smithsonian, for which labor of love Haldeman and Leconte had volunteered. There the meetings of the Academy of Sciences grew in numerical strength and dignity. The Entomological Society was formed in 1859 by Cresson, Bland and Ridings. There the major attended the meetings, a little bent from

his earlier carriage, one hand bearing heavily on his cane, the other on the shoulder of his boy. Auguste Sallé visited them in June, 1854, at their house, 321 West Locust St., and was introduced to "le respectable père," then just past seventy. He found there Motschulsky, who had been working for three weeks over identifications, especially of beetles taken on his southern tour. The Leconte collection had then about 7,000 species, arranged, as Sallé remarks, with great care. In the afternoon the quartet walked, first to the Academy of Sciences nearby, at the corner of Broad and Greoge Sts., then through Fairmount Park. In Philadelphia the major reported "adsum" in 1861 and rendered his final accounting. Born in 1784.

Are the pictures of this career to be drawn with more detail? Is it worth while to follow the journeys of the younger man, to learn whom and what he met? Would it be of interest to listen to some letter from Leconte,¹ to Zimmermann in South Carolina, Harris in Cambridge, Schaum in New Jersey, Haldeman in Philadelphia, or Adams in Vermont, telling about a glorious vacation of four weeks on Mt. Yona,² Georgia? Would we like to learn more than the bare facts of the ten years when young Leconte was hurrying from Superior to Florida, from Nova Scotia to San Diego, from Coney Island to South Orange, losing 20,000 specimens in the San Francisco fire of 1852, robbed of his horses by the Indians near the Gila River and having to walk to camp thirty miles over the desert, constantly amassing the actual material from which he constituted his classification? What of the collectors who fell under the spell of his influence and gave to him their whole collections, types and all? There are many more of them than appear in the checklist. Of any man who in any pursuit becomes the leading authority the chief biographical data cannot but be well known. Yet the principal events of Leconte's life have never been recorded in any one place. Nothing larger than a sketch of him exists. There is an able essay on his genealogy and a careful estimate of his work compared with that of Dr. Horn, rather favoring the latter. The best collection of facts is in the six-page necrological notice by Sallé in the *Annals of the Entomological Society of France*. It is remarkable that in all Leconte's published papers he fails to mention being in any place at any date. No personal element whatever, the word "I" almost omitted. There

² *Batrissus ionae* Lec. commemorates the spot.

is a wealth of material to be developed some day. Some attic will reveal its treasure of letters. The 2,000 or 3,000 John Abbot drawings known to have been collected by Leconte the elder probably still exist. There are thousands of letters to and from the Lecontes tucked away somewhere waiting for editing. Time flies. There are only a score left out of the thousand who read Dr. Horn's laconic telegram of 1883: "Dr. Leconte died at 1.30 o'clock this afternoon," and there is no tyro in beetledom who does not know the man.

NOTES ON ORTHOPTERA FROM THE EAST COAST OF FLORIDA WITH DESCRIPTIONS OF TWO NEW SPECIES OF BELOCEPHALUS.

BY WM. T. DAVIS.

NEW BRIGHTON, STATEN ISLAND, N. Y.

Nearly the entire month of September, 1913, was spent in company with Mr. Charles E. Sleight collecting insects and other natural history objects of interest at several places along the east coast of Florida from Jacksonville to Key West. The writer paid particular attention to the Orthoptera and in all ninety-two species were secured, those from the vicinity of Jacksonville having been turned over to Messrs. Rehn and Hebard, of the Academy of Natural Sciences of Philadelphia, for study in connection with some of their North Florida material. The remaining species collected at La Grange and southward are here recorded, including two new species of *Beloccephalus*, and the very interesting *Phrixia maya*, a large green Katydid-like creature, originally described from Mexico, and now reported for the first time from the United States.

Mr. Howard Chaudoin, of La Grange, and the family of Mr. Wm. H. Sands, of Big Pine Key, have sent me specimens collected in the fall of 1913. These have been here mentioned in connection with the various species.

In New York and New Jersey *Chortophaga viridifasciata* may be found as a mature insect from April to September; the species of *Hippiscus* and *Arphia sulphurca* mature in the spring and die by the

first of August: the majority of the Orthoptera, however, mature about mid-summer and abide until killed by the cold of autumn. The collector in Florida finds no such precision of appearance among Orthoptera, for even as far north as Jacksonville, *Dichromorpha viridis* may be found from April to November, and probably occurs during the intervening months as well. *Scirtetica marmorata picta*, *Psinidia fenestralis* and a number of other species may be found in a mature state during most of the year in central Florida, and in the southern part of the state, the adults of most species may be met with at most any time. Thus we have collected nymphs and adults of *Stilpnochlora marginella* Serv. at Fort Myers and vicinity, in March and April, and at Miami an adult male and two nymphs, one about one half grown and the other very small, were found in September. While the individuals of a species show a tendency to mature about the same time, some few, by reason of their strength and by good fortune in escaping their enemies, do long outlive the majority of their kind.

FORFICULIDÆ.

Anisolabis annulipes Lucas.

Ocean Beach, Miami, Sept. 23, 1 female.

At Pablo Beach in North Florida on Sept. 27, 1913, a female and her sixteen little ones were found in a cell under an old railroad tie. The young ranged from three to four millimeters in length.

Anisolabis maritima Gené.

Cocoanut Grove, Sept. 14; Big Pine Key, Sept. 19, 20; Key West, Sept. 16, 17. Found by turning over the sea-weed lying on the beach.

Labidura bidens Olivier.

Miami, Sept. 22, 1 female.

BLATTIDÆ.

Ischnoptera nigricollis Walker.

La Grange, October (Chaudoin).

Ischnoptera uhleriana fulvescens S. and Z.

Miami, Sept. 24, 1 female; Cocoanut Grove, Sept. 14, 1 male; Big Pine Key, Sept. 19, 20, 1 male, 1 female.

Ceratinoptera diaphana Fabr.

Big Pine Key, Sept. 19, 1913, one.

Ceratinoptera lutea S. and Z.

La Grange, Sept. 10, one.

Eurycotis floridana Walker.

Miami, Sept. 22, 24; Key West, Sept. 17; Big Pine Key, Sept. 19.

Periplaneta americana Linn.

La Grange, Sept. 10, 1 female.

Periplaneta australasiæ Fabr.

La Grange, Sept. 12, 1 female, 1 nymph.

Pycnoscelus surinamensis Linn.

La Grange, Sept. 9, 11, 12; Miami, Sept. 22, 23, 25; Cocoanut Grove, Sept. 14; Key West, Sept. 16.

MANTIDÆ.

Stagmomantis carolina Johannson.

La Grange, Sept. 11, 1 male; Miami, Sept. 24, nymph; Big Pine Key, Sept. 20, 2 nymphs; Key West, Sept. 17, 2 nymphs.

Gonatista grisea Fabr.

Miami, Sept. 22; Big Pine Key, Oct. 1 male, 1 female (Sands).

Thesprotia graminis Scudd.

La Grange, Sept. 12, 2 females; Key West, Sept. 16, 18, 2 females.

PHASMIDÆ.

Manomera tenuescens Scudd.

La Grange, Sept. 12, 2 females; Miami, Sept. 22, 1 female.

Manomera brachypyga R. and H.

La Grange, Sept. 9, 12, 4 males, 1 female.

The two species of *Manomera* were found on the low vegetation in the pine woods at night with the aid of a lantern, when they were active and walking about.

Anisomorpha buprestoides Stoll.

La Grange, Sept. 10, 11, 3 males, 2 females; Miami, Sept. 23, 1 male, 1 female; Big Pine Key, Sept. 20, 3 males, 3 females.

This fat and lubberly insect, which is always ready to squirt a charge of acrid, condensed-milk-like fluid at the collector, was in evidence at all the places visited. While it has been my experience in various parts of Florida to find more nymphs of this species in the spring, yet adults may be found at any season, and each female usually

has attached to herself one of the diminutive males. While we were at La Grange Mr. Sleight discovered under the bark of a dead tree four pairs in copulation and a single male, all closely associated. At night the insect becomes much more active.

ACRIDIDÆ.

Nomotettix floridanus Hancock.

La Grange, Sept. 12, 1 male.

Neotettix femoratus Scudd.

La Grange, Sept. 9, 11, 12, 3 females; Miami, Sept. 25, 1 male.

Tettigidea lateralis Say.

La Grange, Sept. 13, 1 female.

Radinotatum brevipenne Thomas.

La Grange, Sept. 9, 10, 12, 13, 5 males, 4 females; Miami, Sept. 25, 1 female.

Radinotatum brevipenne peninsulare R. and H.

Miami, Sept. 22, 25, 1 male, 1 female; Big Pine Key, Sept. 20, 1 male.

Mermiria intertexta Scudd.

La Grange, Sept. 12, 1 female; Ocean Beach, Miami, Sept. 23, 1 male; Miami, Sept. 22, 1 female; Big Pine Key, Sept. 19, 20, 7 males, 4 females, 1 nymph.

Syrbula admirabilis Uhler.

La Grange, Sept. 9, 10, 12, 3 males, 2 females.

Amblytrophidia occidentalis Sauss.

La Grange, Sept. 9, 10, 11, 7 nymphs; Miami, Sept. 21, 1 nymph; Big Pine Key, Sept. 19, 20, 2 females.

Orphulella pelidna Burm.

La Grange, Sept. 9, 10, 11, 12, 3 males, 6 females; Miami, Sept. 23, 25, 2 females; Cocoanut Grove, Sept. 14, 1 nymph; Big Pine Key, Sept. 19, 20, 3 males, 4 females; Key West, Sept. 16, 2 males, 2 females.

Dichromorpha viridis Scudd.

La Grange, Sept. 9, 11, 6 males, 3 females.

Clinocephalus elegans Morse.

La Grange, Sept. 13, 1 male, 1 female; Big Pine Key, Sept. 19, 1 male.

***Arphia granulata* Sauss.**

La Grange, Sept. 9, 1 male, 1 female; Big Pine Key, Sept. 19, 20, 2 males, 1 female; Key West, Sept. 16, 17, 18, 6 males, 4 females.

***Cortophaga australior* R. and H.**

La Grange, Sept. 9, 10, 11, 2 males, 7 females; Miami, Sept. 25, 1 female; Cocoanut Grove, Sept. 14, 1 female; Big Pine Key, Sept. 19, 1 male; Key West, Sept. 16, 17, 18, 7 males, 8 females.

***Hippiscus phœnicopterus* Germ.**

La Grange, Sept. 13, 1 male.

***Scirtetica marmorata picta* Scudd.**

La Grange, Sept. 9, 11, 12, 13, 5 males, 4 females; Ocean Beach, Miami, Sept. 23, 3 males, 2 females; Miami, Sept. 22, 1 female; Cocoanut Grove, Sept. 14, 4 males.

***Psinidia fenestralis* Serv.**

La Grange, Sept. 9, 10, 3 males, 2 females; Miami, Sept. 24, 1 female; Ocean Beach, Miami, Sept. 23, 2 males, 1 female; Cocoanut Grove, Sept. 14, 2 males.

***Trimerotropis citrina* Scudd.**

Key West, Sept. 16, 17, 4 males, 3 females. On the seashore sand at Ocean Beach, Miami, on Sept. 23, 5 males and 3 females were collected that have pink hind femora and resemble *citrina* except that the black band on the hind wings is narrow, as in *maritima*. They may, however, be *maritima*, for in the author's collection there is a female *maritima* from Fire Island, N. Y., with pinkish hind femora.

***Rhomalea microptera* Beauv.**

La Grange, Sept. 12, 1 male, 1 female; Miami, Sept. 22, 1 female. Several of these large grasshoppers in a flower bed will destroy a number of the plants, and so at La Grange the country people often killed them on sight.

***Leptysma marginicollis* Serv.**

La Grange, Oct., 1913, female (Chaudoin).

***Schistocerca americana* Drury.**

La Grange, Ocean Beach, Miami, Big Pine Key, Key West. Mature individuals of this species are to be found at all seasons in central and northern Florida, and many recently matured individuals are to be found in the southern part of the state, at least on the West Coast in March and April. Again in the fall some of the individuals

found have but recently matured, as their elytra are still soft and they haven't acquired their full power of flight.

Schistocerca alutacea rubiginosa Harris.

La Grange, Sept. 12, 1 male; Miami, Sept. 22, 1 male, 2 females.

Schistocerca obscura Fab.

La Grange, Sept. 10, 1 male; Miami, Sept. 22, 1 female.

Schistocerca damnifica calidior R. and H.

La Grange, Sept. 9, 11, 12, 5 males, 2 females; Miami, Sept. 22, 1 female.

Eotettix signatus Scudd.

La Grange, October, 1 female (Chaudoin).

Melanoplus rotundipennis Scudd.

La Grange, Sept. 9, 10, 12, 13, 4 males, 4 females.

Melanoplus keeleri Thomas.

La Grange, Sept. 9, 10, 11, 12, 5 males, 5 females; Miami, Sept. 22, 23, 2 males, 1 female.

Paroxya atlantica Scudd.

La Grange, Sept. 11, 13, 3 males; Miami, Sept. 23, 24, 25, 2 males, 1 female; Cocoanut Grove, Sept. 14, 1 male.

Paroxya atlantica paroxyoides Scudd.

Big Pine Key, Sept. 19, 20, 21, 3 males, 4 females; Key West, Sept. 16, 18, 9 males, 8 females.

Aptenopedes sphenarioides Scudd.

La Grange, Sept. 9, 11, 12, 4 males, 4 females.

Aptenopedes clara Rehn.

Miami, Sept. 22, 25, 3 males, 1 female; Ocean Beach, Miami, Sept. 23, 1 male, 1 female; Cocoanut Grove, Sept. 14, 1 nymph; Big Pine Key, Sept. 19, 1 male, 2 females, 3 nymphs; Key West, Sept. 16, 1 male, 1 female, 1 nymph.

Aptenopedes aptera Scudd.

La Grange, Sept. 9, 10, 11 males, 18 females, 2 female nymphs; Miami, Sept. 22, 25, 5 males, 3 females; Cocoanut Grove, Sept. 14, 1 female. This species is active at night, when it is no uncommon sight to see several of the grasshoppers devouring the leaves of the scrub palmetto into which they make half-moon shaped cuts eating down to the midrib.

TETTIGONIIDÆ.

Scudderia texensis Sauss and Pictet.

La Grange, Sept. 12, 13, 3 males, 1 female; Miami, Sept. 22, 1 male.

Scudderia furcata Brunner.

La Grange, Sept. 12, 1 female.

Scudderia cuneata Morse.

Miami, Sept. 24, 2 males.

The apical expanded portion of the anal segment shows considerable variation in specimens from Florida all referred to this species.

Amblycorypha floridana R. and H.

La Grange, Sept. 11, 1 male, 1 female; Big Pine Key, Sept. 20, 2 males, 2 females.

Microcentrum rostratum R. and H.

Miami, Sept. 22, 1 male; Big Pine Key, Sept. 19, 20, 2 females.

Microcentrum rhombifolium Sauss.

Miami, Sept. 22, 1 male.

Stilpnochlora marginella Serv.

Miami, Sept. 22, 23, 1 male and two nymphs, all from Brickell's Hammock. We found this insect mature at Ft. Myers on the west coast in March, 1912.

Phrixa maya Sauss and Pictet.

Miami, Sept. 22, 1 male.

Mr. Sleight and I were "shining the road" that leads through Brickell's Hammock with our lanterns on the evening of Sept. 22, 1913, when this peculiar insect was found on the side where my friend was walking. He kindly turned it over to me for study, and its identification was made easy by the excellent cut of a male *Phrixa maya* on Plate XVI, fig. 2, Vol. 1 of *Biologia Centrali-America*, Orthoptera, in which volume the insect is also described. The authors have this to say: "A very peculiar genus, the species of which have broad and obliquely truncated elytra. In the males the anal field is very small, coriaceous, densely punctate-reticulate, and the stridulating vein is very obsolete above on the left elytron. This genus is known only from Mexico." The development of the cerci is also remarkable. The type came from "Mexico, Valladolid in Yucatan (Gaumer)," and the discovery of the insect in Florida is of much interest and adds a species to the known fauna of the United States.

***Cryptophyllus floridensis* Beut.**

La Grange, Sept. 10, 11, 12, 1 male, 1 female, 1 nymph

We sometimes heard among the oaks and cabbage palms, but not in the pine woods, a low *chluck, chluck*, evidently the call of some large insect, though its carrying power was poor and one had to be quite near in order to hear it. There were several of the insects about, and one evening when the moon was shining brightly and with the aid of a lantern, one was discovered among the leaves of a cabbage palm. Enough was seen to identify it with a *Cryptophyllus floridensis* presented to me by young Mr. Chaudoin, and the next day I knocked a female of the same species from a cabbage palm into my umbrella. A nymph was found at night hanging from moss on a low palmetto, drying itself, having just shed its skin. This nymph was brownish in color, but the adult male and female were all green. The type came from near Grant, also on the east coast of Florida, and was described as greenish gray in color, but it probably was all green in life. Mr. Beutenmuller reports its stridulation as a "continuous Ker-Ker-Ker-Ker, with about one second interval of rest," but to the writer the note sounded more like *chluck, chluck*, and we used to speak of them as "the chlucks."

Near Miami, one hundred and eighty miles to the south of La Grange, one of these insects was heard stridulating every evening in the latter part of September. It lived among the Spanish moss in a large oak in a clearing, and as it always took alarm at the light of my lantern it could not be observed, much less collected. *Cryptophyllus floridensis* is a larger species than the well-known Katy-did of the north, though its call note is quite feeble in comparison. Owing to several peculiarities of structure it has been placed in a genus by itself called *Lca*, by Mr. Andrew N. Caudell (Journal N. Y. Ento. Soc., vol. XIV, p. 42, March, 1906), who has also described the female. There is another species of Katy-did living in Florida, which was heard in some numbers near Ortega, along the St. Johns River, not far from Jacksonville. Its note is loud and like that of *Cryptophyllus perspillatus*.

***Belocephalus subapterus* Scudd.**

La Grange, Sept. 10, 1 brown female in grass by railroad; Sept. 11, 1 green female (Ds); October, 2 green males, 1 green female and 2 brown females (Chaudoin). The identification of the females is a

trifle uncertain, but from locality and association with the males they are probably *subapterus*.

***Belocephalus sabalis* Davis.**

Miami, Sept. 22, 2 green males; Sept. 24, 1 green male; Sept. 25, 4 green males and 1 brown male; Cocanut Grove, Sept. 14, 1 green male.

These specimens from the east coast of Florida agree with those collected at Punta Gorda, the type locality, in November, 1911. The longitudinal lines on the head and thorax usual in *Belocephalus* are present in this species, but fade away after death.

***Belocephalus sleighti*, new species.**

Types, green male and brown female, Big Pine Key, Monroe Co., Fla., Sept. 19, 20, 1913. Mandibles black, the upper surface of the head and pronotum in the green male with a faint line on either side of a yellowish color; these lines are pronounced in the brown female and bordered interiorly with blackish. Fastigium sharp pointed, not as long as in *sabalis*, slightly bent downward and tipped with black. Inferior basal tooth of fastigium in female also tipped with black. The antennæ are unicolorous, a little longer than the body in the male and somewhat shorter in the female. Tegmina about two thirds as long as the pronotum. Abdomen with a scarcely perceptible carina. Legs unicolorous, except the tips of the spines which are black. The supranal plate of the male with the inner sides of the V-shaped notch rounded and the notch itself not nearly so broadly open as in *sabalis*. The subgenital plate of the male is notched and has two stout appendages (styles) with rounded extremities. They are about twice as long as broad. The outer extremities of the plate are not bent upward and inward and produced into points.

	Male. Mm.	Female. Mm.
Length of body	40	42
Length of fastigium beyond base of antennæ	2.5	3
Length of pronotum	10	10.5
Length of tegmen	7	3
Length of caudal femur	18	20
Length of ovipositor		17

In addition to the types twelve green and two brown males, one green female and two nymphs have been examined from Big Pine Key, all collected on Sept. 19 and 20, 1913. They were captured at night on the scrub palmettos and various low bushes, and their song was much like that of *Belocephalus sabalis* as described in this JOURNAL, Vol. XX, p. 122, June, 1912. This insect is named after

Mr. Charles E. Sleight of Ramsey, N. J., the companion on my journey.

***Belocephalus micanopy*, new species.**

Types, green male and brown female, Big Pine Key, Monroe Co., Fla., Sept. 19 and Oct., 1913. Mandibles, lower edge of front and base of antennæ beneath, black. The upper surface of the head and pronotum with a faint line on either side of a yellowish color, which is bordered interiorly with blackish. These stripes extend from the fastigium backward to the base of the thorax in the male and on to the abdomen in the female. They are more parallel in the female than in the male. The area included between the stripes is darker in the female than the general body color, thus forming a brown dorsal stripe edged with blackish and straw color. Fastigium short, blunt pointed and tipped with black. Inferior basal tooth of fastigium also tipped with black. Antennæ longer than the body in the male, not quite as long in the female, with the first joints in both sexes annulated with black, the color fading out toward the tip. Abdomen with a scarcely perceptible, interrupted carina. The femora and tibiæ of all of the legs blotched with brown at the knees, and the tips of the spines are black. The supra-anal plate of the male with the V-shaped notch not broadly open and its inner sides rounded. The subgenital plate of the male has two tapering appendages (styles) that are about three times as long as broad. The outer extremities of the plate are bent upward and inward and produced into points.

	Male, Mm.	Female, Mm.
Length of body	30	30
Length of fastigium beyond base of antennæ	2	2
Length of pronotum	9	9
Length of tegmen	7.5	3
Length of caudal femur	16	16
Length of ovipositor		19

In addition to the types, three brown males have been examined, all from Big Pine Key. The female type and two of the males were collected in October, 1913, and sent to me by the family of Mr. Wm. H. Sands; the remaining two males were collected on Sept. 19, 1913. They were found among the leaves of the silver-palm, *Coccothrinax argentea* Lodd, which is not uncommon on Big Pine Key. The song of this species is slow and readily distinguishable from that of *Belocephalus sleighti*. The male type is slightly larger than some of the other males of the series.

Six species of *Belocephalus* are now known from Florida and there are probably several others to be discovered. The insects cannot fly and are not active walkers, so they do not get about much.

It is, therefore, not remarkable that every few hundred miles a different species should appear, especially on some of the Keys like Big Pine Key, which lies about thirty-five miles to the south of the mainland of Florida.

Females of five of the species are known and it is of interest that the stripes that commence at the fastigium and extend backward to the posterior margin of the prothorax, or on to the abdomen in some individuals, are nearly parallel, whereas in the males these stripes diverge as they extend backward from the head to the posterior margin of the prothorax. In brown individuals there is a conspicuous darker dorsal band the sides of which are either parallel or divergent on the head and thorax according to sex.

It may be well to state that the natural colors in *Belocephalus* and other green Katy-did-like insects can best be preserved by placing them when dead in a solution of about nineteen parts of water to one of commercial formalin. They should be packed tightly enough in the bottle to prevent their being jostled about in traveling, and should be removed after a few weeks' stay at most in the solution.

Scudder described *Belocephalus subapterus* in the Proceedings of the Boston Society of Natural History, Vol. XVII, 1875, and in a paper by the writer on "Three New Species of *Belocephalus* from Florida," this JOURNAL, Vol. XX, p. 123, June, 1912, additional facts were made known.

The six species so far described may be separated as follows:

Vertex of the head produced as a stout sub-cylindrical thorn tapering apically.

Body of male about 40 mm. in length; antennæ unicolorous. The outer extremities of the subgenital plate not bent upward and inward, and not produced into points.

Supra-anal plate with the inner sides of the V-shaped notch nearly straight. Hind femora about 20 mm. in length.....*sabalis* Davis.

Supra-anal plate with the inner sides of the notch rounded. Hind femora about 18 mm. in length.....*sleighti* n. sp.

Body of male about 34 mm. in length; antennæ spotted. The outer extremities of the subgenital plate not bent upward and inward and produced into sharp points.....*subapterus* Scudd.

Body of male about 34 mm. in length; antennæ spotted. The outer extremities of the subgenital plate bent upward and inward and produced into sharp points.....*hebarði* Davis.

Vertex of the head rounded, no thorns.

Body of male about 25 mm. in length. The outer extremities of the sub-

genital plate are not bent upward and inward into points. Supra-anal plate with the V-shaped notch very broad and its inner sides straight.

rehni Davis.

Body of male about 30 mm. in length. The outer extremities of the subgenital plate bent upward and inward and produced into points. Supra-anal plate with the V-shaped notch not broadly open and its inner sides rounded.....*micanopy* n. sp.

As the vertex of the head is subject, particularly in some of the species, to a little variation it may be well to supplement the foregoing table for the assistance of those without a series of specimens at hand.

Outer extremities of the subgenital plate bent upward and inward and produced into points. Antennæ spotted.

Vertex of the head rounded, no thorn. (Big Pine Key, Fla.)

micanopy n. sp.

Vertex of the head sharp pointed. (Punta Gorda, Fla.)...*hebard*i Davis.

Outer extremities of the subgenital plate not bent upward and inward and produced into points.

Antennæ spotted.

Vertex of the head sharp pointed. (N. E. Fla., etc.)

subapterus Seudder.

Vertex of the head rounded, no thorn. (Newberry, Fla., type loc.)

rehni Davis.

Antennæ unicolorous, body of male about 40 mm. in length, vertex of head sharp pointed.

Supra-anal plate with the inner sides of the V-shaped notch nearly straight. Hind femora about 20 mm. in length. (Southern Fla.)

sabalis Davis.

Supra-anal plate with the inner sides of the notch rounded. Hind femora about 18 mm. in length. (Big Pine Key, Fla.)

sleighti n. sp.



B. sabalis.



B. sleighti.



B. rehni.



B. micanopy.

Viewing the material at hand as a whole we find *Belocephalus sabalis* and *sleighti* to be large and robust species, while the others are smaller and do not give one the impression of being such fat, lubberly insects. In *subapterus*, *rehni* and *hebard*i the supra-anal

plate is similarly shaped, though slight differences appertain in this respect to each of the three species.

***Pygocorypha uncinata* Harris.**

Miami, Sept. 22, 23, 24, 25, 11 males, 7 females, all of them brown in color and many eating grass at night. None were heard singing.

***Neoconocephalus mexicanus fuscostriatus* Redt.**

Big Pine Key, Sept. 20, 1 male. A male was heard singing in a garden in Key West.

***Odontoxiphidium apterum* Morse.**

La Grange, Sept. 9, 10, 11, 12, 3 males, 10 females, 1 nymph; Miami, Sept. 22, 23, 24, 25, 3 males, 5 females; Cocoanut Grove, Sept. 14, 6 males, 1 female.

***Orchelimum glaberrimum* Burm.**

La Grange, Sept. 9, 10, 13, 5 males. This species was also heard singing along the banks of the Miami river on Sept. 25. We have followed Rehn and Hebard in using this name for the present species, though it is evidently not the insect to which the name has been applied by Scudder, McNeill, Redtenbacher and others. Burmeister's type came from South Carolina, but his description would cover several of our species of *Orchelimum*. While the present species has a red head like *O. erythrocephalum* of New Jersey, it is much larger. A series from Raleigh, N. C., shows that they are more nearly related to those from Florida, than to *erythrocephalum* from New Jersey, which may prove to be a northern race.

***Orchelimum militare* R. and H.**

La Grange, Sept. 13, 1 male (Ds.), Oct., 3 females (Chaudoin).

***Conocephalus gracillimus* Morse.**

Cocoanut Grove, Sept. 14, 1 male; Big Pine Key, Sept. 19, 20, 2 males, 1 female.

***Conocephalus fasciatus* DeGeer.**

La Grange, Sept. 11, 12, 1 male, 1 female.

GRYLLIDÆ.

***Cryptoptilum antillarum* Redt.**

La Grange, Sept. 10, 1 female; Miami, Sept. 22, 23, 24, 4 males, 8 females, 7 nymphs; Big Pine Key, Sept. 19, 20, 1 female, 3 nymphs; Key West, Sept. 16, 17, 2 females, 2 nymphs.

Cryptoptilum trigonipalpum R. and H.

La Grange, Sept. 12, 3 nymphs; Miami, Sept. 24, 3 nymphs; Big Pine Key, Sept. 19, 20, 5 nymphs; Key West, Sept. 16, 17, 9 nymphs.

Cycloptilum zebra R. and H.

Ocean Beach, Miami, Sept. 23, 6 males, 7 females. These and others that escaped were found under and in the folds of an old pair of trousers lying on the up-beach.

Nemobius fasciatus socius Scudder.

La Grange, Sept., 1 female.

Nemobius ambitiosus Scudder.

La Grange, Sept. 10, 11, 1 male, 1 female, 2 nymphs.

Miogryllus saussurei Scudder.

La Grange, Sept. 12, 1 male; Miami, Sept. 22, 23, 25, 1 male, 5 females, 1 nymph.

Gryllus rubens Scudd.

La Grange, Sept. 11, 1 male; Miami, Sept. 25, 1 female.

Gryllodes sigillatus Walk.

Miami, Sept. 22, 24, 25, 1 male, 2 females; Big Pine Key, Sept. 19, 20, 1 male, 1 female. At Miami they were found on the sidewalk in front of a store near the bridge that crosses the river, and at Big Pine Key they lived in Mr. Sands' house, where they were reported as doing some damage by eating clothing, etc. At night when the lights were out they would come out of their hiding and the males would sing their cheerful and very energetic song.

Æcanthus angustipennis Fitch.

La Grange, Sept. 10, 3 males. Collected among the golden rods and other low plants by the side of the road. They also occurred among the small oaks and other trees. The song is loud, about three or four seconds long, with an equal interval of rest. We have found this insect at Lakeland, Florida, on two occasions, but it has not been reported so far from other localities in the state, though no doubt common in some of the northern counties as it is a northern species.

Cyrtoxipha gundachi Sauss.

Miami, Sept. 24, 1 female, 2 nymphs; Big Pine Key, Sept. 19, 20, 2 males, 2 females, 2 nymphs; Key West, Sept. 16, 17, 18, 2 females, 5 nymphs. Adults were much less common than the nymphs, no effort being made to collect all of the latter.

Hapithus quadratus Scudd.

Miami, Sept. 22, 24, 25, 6 males, 7 females; Key West, Sept. 18, 1 female.

Hapithus brevipennis Sauss.

La Grange, Sept. 11, 2 females; Cocoanut Grove, Sept. 14, 1 male, 1 female.

Orocharis saulcyi Guer.

Miami, Sept. 22, 1 male.

Tafalisca lurida Walk.

La Grange, Sept. 10, 11, 2 males; Big Pine Key, Sept. 19, 20, 2 females (Ds.), Oct., 1 male (Sands).

**A REVISION OF THE AMERICAN SPECIES OF
TANYPREMNA OSTEN SACKEN AND MEGIS-
TOCERA WIEDEMANN. (TIPULIDÆ,
DIPTERA.)¹**

BY CHARLES P. ALEXANDER,

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This paper is presented in order to complete the American species of the Dolichopezini that are allied to *Megistocera* Wiedemann. These genera are *Brachypremna* Osten Sacken which has been taken up by the author in an earlier paper (Journ. N. Y. Ent. Soc., vol. XX, p. 225-236, 1912), *Tanypremna* Osten Sacken and *Megistocera* Wiedemann which will be considered in the present paper in the order named. A key to the Dolichopezine genera of the world is given in *Psyche*, vol. XIX, p. 64, 1912.

I am indebted to Mr. Frederick Knab for the loan of the material in the United States National Museum; to Mr. E. T. Cresson, Jr., for the specimens in the Philadelphia Academy of Sciences; to Mr. C. W. Johnson for a *Tanypremna* taken on the Mann expedition to Brazil; to Dr. F. H. Lutz for the material in the American Museum of Natural History; and to Mr. John Thomas Lloyd for the species of *Tanypremna* herein described as new.

¹ Contribution from the Entomological Laboratory of Cornell University.

TANYPREMNA Osten Sacken.

1886. *Tanypremna* Osten Sacken; Biol. Cent. Am., Dipt., vol. 1, p. 19 (*opilio*).

1912. *Stegasmonotus* Enderlein; Zool. Jahrb., vol. 32, pt. 1, p. 11 (*longissimus*).

1912. *Pehlkea* Enderlein; l. c., p. 15 (*columbiana*).

The genus *Tanypremna* was erected in 1886 by Osten Sacken to receive the then unique species, *opilio*, of Guatemala. The following year the same author described *T. manicata* from Brazil. In a recent paper Dr. Enderlein has erected two new genera which must be considered synonymous with *Tanypremna* and the two types make the third and fourth American species. The *Tipula longipes* of Fabricius is now known to be a member of this genus, while the new form herein described as *Tanypremna regina* is the sixth species to be made known. The species most closely allied to the genotype, *opilio*, are *columbiana* which Enderlein made the type of a new genus, *Pehlkea*, and the new species, *regina*. *T. columbiana* Enderlein has a strong supernumerary cross-vein in cell *M*, this latter character being also found in *regina*, which, moreover, possesses a considerable series of such veins and spurs of veins in both of the basal cells. This character of supernumerary cross-veins is one which has been over-emphasized in the past in the formation of genera and it is doubtful whether even subgeneric rank should be given to the majority of such forms. The extreme plasticity of these characters is shown in such genera as *Cladura*, *Gnophomyia*, *Tricyphona*, and others, in which these supernumerary cross-veins may be present or absent in the two wings of a single specimen. In the various subgenera of *Limnophila* such as *Ephelia*, *Idioptera*, *Dicranophragma*, etc., which possess these supernumerary cross-veins in all specimens, it is known and appreciated that these groups are scarcely of subgeneric value. Considering the very close relationship existing between *opilio*, *columbiana* and *regina*, and taking into account the plasticity of the characters used in their diagnosis, I am unwilling to consider the forms as representing more than very well-defined species of this genus, *Tanypremna*.

The species of *Tanypremna* appear to be quite uncommon and not often picked up by collectors. This is well shown by the fact that each species was founded upon a single specimen and scarcely a dozen specimens are known to be in existence in the various museums.

CHARACTERS OF THE GENUS.

Frontal prolongation of the head very short and stout, about as deep as long; the nasus long and prominent, clothed at the tip with long hairs; palpi with the last segment longer than any of the others. Antennæ very short, the basal segments larger, the flagellar segments oval, more elongated toward the end. Front very broad between the eyes with no protuberance.

Prothorax viewed from the side very narrow, the scutellum closely applied to the mesonotal præscutum and the head, in turn, closely applied to this. Mesonotal præscutum very gibbous, partly or almost entirely concealing the head when viewed from above. Halteres long and slender. Legs very long and slender, the tarsi especially being excessively elongated.

Wings with vein Sc long, Sc_1 persistent at the wing-margin and quite close to R_1 at its tip; Rs short, usually arcuated but sometimes straight though never so square at the origin as in *Brachypremna*; R_2 usually distinct, oblique, rarely vertical as in *Brachypremna*. Second anal vein usually long and not ending close in the anal angle of the wings. In *longipes* Fabricius, R_2 is swung proximad at its tip so that it is very close to R_1 at the wing-margin; Rs is oblique, straight and second anal is rather short. *T. columbiana* has a strong supernumerary cross-vein in cell M , and *T. regina* has this cross-vein and spurs of many other in the basal cells.

Abdomen elongated, in the females of some species, excessively long and slender.

Coloration.—Usually light yellow, the thoracic dorsum dark brown, the pleurae yellow with brown transverse bands. Legs brown, the segments having more or less white. Wings usually subhyaline with the veins indistinctly seamed with darker, rarely the whole disk marbled with darker.

A KEY TO THE AMERICAN SPECIES OF TANYPREMNA OSTEN SACKEN.

- | | | |
|----|---|---|
| 1. | Tibiae with more or less white before or at its tip..... | 2 |
| | Tibiae with the base abruptly white but the remainder of the segment dark colored | 4 |
| 2. | First tarsal segment broadly white medially, dark at both ends; remaining tarsal segments entirely white; [radial sector of the wings short, straight, oblique, forming a V with the deflection of R_{2+3}]. (Guiana, Brazil.)
<i>longipes</i> Fabricius. | |
| | Tarsal segments one and two tipped with white..... | 3 |

3. Wings hyaline with the apical veins seamed with brown: [abdomen very long, slender: length of the body of the female over 50 mm.]. (Brazil.)
longissima Enderlein.

Wings pale brown with a darker brown stigma: [body less elongate, the tip of the abdomen of the type and only known specimen is broken and the length can not be accurately determined; it was estimated to be 14 mm. by Osten Sacken: some brown on the third tarsal segment]. (Brazil.)
manicata Osten Sacken.

4. No supernumerary cross-vein in cell *M*. (Guatemala, Venezuela.)
opilio Osten Sacken.

A supernumerary cross-vein in cell *M*. 5

5. Wings with the seaming limited, confined to the cord and the supernumerary cross-vein in cell *M*; wing of the male 18.5 mm. (Colombia.)
columbiana Enderlein.

Wings heavily marbled with brown in almost all the cells; wing of the male 22 mm. (Colombia.) *regina* n. sp.

Tanypremna longipes Fabricius.

1805 *Tipula longipes* Fabricius; Syst. Antl., p. 25. 1821 *Tipula longipes* Wiedemann; Dipt. exot., vol. 1, p. 37, 41. 1828 *Tipula longipes* Wiedemann; Aussercur, zweifl. Ins., vol. 1, p. 43. 1834 *Tipula longipes* Macquart; Suite à Buffon, vol. 1, p. 82. 1900 *Tipula longipes* Hunter; Trans. Am. Ent. Soc., vol. 26, p. 286. 1902 *Tipula longipes* Kertész; Cat. Dipt., vol. 2, p. 293. 1912 *Stegasmonotus longipes* Enderlein; Zool. Jahrb., vol. 32, pt. 1, p. 13. 1913 *Tanypremna longipes* Alexander; Proc. U. S. Nat. Mus., vol. 44, p. 487.

Female, length 24 mm.; wing, 12.6–12.8 mm.; abdomen, 20.1–20.2 mm.

Fore leg, femur, 9.6 mm.; tibia, 12.4 mm.; tarsus 1, 15.5 mm.; tarsus 2 to 5, 8.1 mm.

Hind leg, femur, 12 mm.; tibia, 13 mm.; tarsus 1, 16.4 mm.; tarsus 2 to 5, 10.6 mm.

Frontal prolongation of the head short, pale dull yellow, the nasus rather long with a brush of hairs at the tip; lower part of the rostrum dark, blackish; palpi with the two intermediate segments pale, the first and last being dark colored, the latter named segment very long. Antennæ short, the scapal segments and the base of the first flagellar segment pale, yellowish, remainder of the antennæ dark brownish black. Front pale yellowish white, on the vertex passing into brown, the occiput dark.

Pronotal scutum broadly dark brown medially, paler on the sides. Mesonotal præscutum dark brown, medially this color extending to the extreme cephalic margin which is darkest, the space in front of the dark mark on the pseudosuture described below is very pale, almost

white; the præscutum with deep impressed lines extending from the pseudosutural foveæ caudad to the transverse suture; a dark brownish black mark at the humeral angle of the sclerite extending ventrad onto the pleuræ; scutum dark brown, a little paler medially; scutellum and postnotum brown, the latter a little paler on the sides. Pleuræ pale, yellowish white, with a broad brown stripe extending from the humeral angle of the præscutum ventrad and caudad across the mesopleuræ, splitting near the base of the fore coxa, the anterior fork broad suffusing the sides of the mesosterna and the base of the mesocoxæ. Halteres long and slender, the stem pale brown, the knob dark. Legs with the coxæ pale except the mesocoxæ as described above; fore legs with the trochanters having a decided green caste, femora dark brown, the base pale, tibiæ with the base broadly pale, about equal in width to the black apical ring, a rather broad white subterminal band; metatarsus dark brown, the white medial band a little broader than the dark basal ring, remainder of the tarsi white. Hind legs with the femora brown, the tibiæ with the basal three-fifths dark brown, the remainder snowy white excepting a broad dark brown tip; metatarsus white except the broad brown base and apex; remainder of tarsi pure white. Wings usually with a light brown tinge, in some more nearly hyaline, and the costal cell brown; stigma dark brown, the cord more indistinctly seamed with brown. Venation as in fig. 1: R_s oblique, short and straight; the deflection of R_{2+3} arcuated, forming a V with the end of the sector; R_2 short and showing a tendency to atrophy; basal deflection of R_{4+5} lacking.

Abdominal tergites 2 to 4 brown with a broad white basal blotch on the sides and a broad white blotch on either side beyond the middle, the extreme lateral margin of the sclerite narrowly blackish brown; apical tergites uniformly dark brown. Sternites dull yellow, the ovipositor reddish brown.

Distribution.—British Guiana, Upper Potaro River, July 17, 1911. (Crampton.) Specimen, a female, in the collection of the American Museum of Natural History. Brazil, Manaos (Mann). Specimen a female in the collection of Mr. C. W. Johnson.

***Tanypremna longissima* Enderlein.**

1912. *Stegasmonotus longissimus* Enderlein; Zool. Jahrb., vol. 32, pt. 1, p. 11, 12.

Female, length, 55 mm.; wing, 22.5 mm.; abdomen, 48.5 mm.

Fore leg, femur, 11.5 mm.

Middle leg, femur, 16 mm.; tibia, 18.5 mm.; tarsus 1, 22 mm.; 2, 10.75 mm.; 3, 6 mm.

Hind leg, femur, 19 mm.; tibia, 22 mm.; tarsus 1, 20 mm.; 2, 10.5 mm.; 3, 5.5 mm.

Head whitish; occiput for the most part blackish brown, vertex pale brownish. Prolongation of the frontal part of the head scarcely one-quarter as long as the remaining length of the head. Palpi greenish, the last segment greyish black. Antennæ short (2.25 mm. long) very thin and delicate, 13-segmented, pale, the tips of the very slender flagellar segments grey, the last five flagellar segments entirely grey, basal segments greenish; at the end of each flagellar segment rather long fine hairs, somewhat verticillate. Forehead broad; tubercle lacking.

Thorax gibbous, extending far forward and projecting over the head so that viewed from above nothing is to be seen of the latter. Thoracic dorsum dark brown, a broad seam in front; a narrower seam on the sides up to the wing-root yellowish white; the dark brown color extends to the cephalic margin as a moderately broad stripe. Præscutum with a somewhat elevated blackish-brown median line. Scutum brown, very level. Postnotum long, brown, whitish yellow on the sides with an impressed crossline on the middle which forms an obtuse angle medially (concave in front) and from this angle sends out an impressed longitudinal line backward. Metapleuræ greyish brown. Prothorax greyish brown medially, whitish elsewhere. Abdomen extremely long and slender, dark brown above, ochre-yellow beneath, on the middle of the tergites one to three there is a sharp pale crossline, on tergites four to seven a light spot on each side of the middle; eighth segment short, scarcely one and one-half times as long as broad; genital segment with the moderately elongated and rather powerful ovipositor reddish brown, polished, smooth, and 6 mm. long. Fore femora pale greyish green with a narrow brown ring before the tip. Middle legs blackish brown, the tibiae with a very broad white ring before the tip; almost the apical half of tarsal segments one and two white, the third tarsal segment entirely white, remaining segments broken. Hind femora reddish yellow, darker brown at the tip; tibiae blackish brown with a broad

white ring before the end; tarsal segments one and two blackish brown with somewhat more than the apical half white; remaining tarsal segments white. Claws small, reddish brown. Halteres with the pedicel long, yellowish brown, the knob brown. Wings hyaline, veins dark brown. All veins on the apical quarter of the wings seamed with pale brown, all of the cross-veins and deflections of veins brown and more broadly seamed. R_2 very short and ends close to R_1 (on the left wing R_2 is quite lacking); Cu_1 in punctiform contact with cell 1st M_2 ; Rs short, not longer than R_{2+3} . Membrane very smooth but with greenish reflections only at the tip.

Distribution.—Brazil, Espiritu Santo.

Translated from the original description.

***Tanypremna manicata* Osten Sacken.**

1887. *Tanypremna manicata* Osten Sacken; Berl. Ent. Zeitschr., vol. 31, pt. 2, p. 240.

1902. *Tanypremna manicata* Kertész; Cat. Dipt., vol. 2, p. 265.

Yellowish brown, thoracic dorsum with three almost confluent brown stripes; brown spots on the metanotum. Antennæ pale yellow, darker towards the tip; halteres brownish yellow; abdomen yellowish brown (tip broken). Legs dark brown, but femora paler; a small white ring before the tip of the tibiæ; three successive white rings at the end of tarsal joints one, two and three. Wings with a pale brownish tinge; stigma brown.

Habitat.—Brazil (discoverer, Sellow); a single specimen in the Berlin Museum; sex uncertain, as the tip of the abdomen is broken off. The length, when the abdomen is entire, must be about 14 mm. The number of joints of the antennæ is certainly more than eleven (this number I counted in *T. opilio*).

The above is taken verbatim from Osten Sacken's original description; the type specimen seems to be the only one so far taken.

***Tanypremna opilio* Osten Sacken.**

1886. *Tanypremna opilio* Osten Sacken; Biol. Cent. Amer., Dipt., vol. 1, p. 19, pl. 1, f. 2.

1887. *Tanypremna opilio* Osten Sacken; Berl. Ent. Zeitsch., vol. 30, pt. 2, p. 164.

1902. *Tanypremna opilio* Kertész; Cat. Dipt., vol. 2, p. 265.

Male, length, 23.4 mm.; wing, 18 mm.; abdomen, 20.4 mm.

Fore leg, femur, 12.8 mm.; tibia, 15.3 mm.; metatarsus, 24.2 mm.

Hind leg, femur, 14.5 mm.; tibia, 15 mm.

Female, length, 26.2 mm.; wing, 18.3 mm.; abdomen, 22.2 mm.

Hind leg, femur, 13.9 mm.; tibia, 13.8 mm.; metatarsus, 18.7 mm.

Frontal prolongation of the head yellow, the nasus long, clothed with dark hairs; the palpi and lips dark brown. Antennæ with the basal segments yellow, flagellum black, antennæ with thirteen segments (not eleven as given by Osten Sacken). Head light yellow except a linear brown blotch on the vertex along the inner margin of each eye.

Pronotal scutum brownish black, this color produced ventrad onto the propleuræ and including the anterior face of the pro-coxa. Mesonotal præscutum deep chocolate brown, darkest in front, with three very narrow darker lines, one median, the other two lateral. A yellow patch on the sides of the sclerite in front, before the pseudosutural fovea; a dark brownish black stripe begins at the pseudosuture and traverses the mesopleuræ, ending on the anterior face of the mesocoxa, scutum, scutellum and postnotum dark chocolate brown, the latter with a pale, narrow median line. Pleuræ light yellow with the vertical brown bands as described above; sides of the postnotum and the caudal face of the metacoxæ brownish black. Halteres very long, dull yellow, the knob brown. Legs with the coxæ as described above, trochanters greenish yellow, femora brownish black, tibiæ brownish black with the extreme base rather broadly white, tarsi white. Wings with a rather uniform light brown suffusion, stigma dark brown; the veins seamed with a light greyish brown. Venation as in fig. 2.

Abdominal tergites brown, the lateral margins of the sclerites rather broadly black which color runs across the dorsum as a sub-apical band; extreme apices of the basal tergites paler; the terminal tergites uniformly dark brown. Sternites dull yellow with an apical annulus of black and in the terminal segments a medial band also; the eighth segment black; hypopygium reddish.

Distribution.—Guatemala, Cacao, Alta, Vera Paz, April 23 (Schwarz and Barber), Purula, Vera Paz; altitude, 5,000 feet (Champion). Venezuela, Cariaquito, Jan. 22, 1911 (S. Brown).

The specimen from Cacao is a female in the U. S. National Museum collection. The Purula specimen is Osten Sacken's type. The Venezuela material consists of a fine pair in the collection of the American Entomological Society, Philadelphia.

This is the only species concerning which we have any ecological

data; the note by Champion who collected the type, tell us that the insect lives in the humid forest regions of the mountains (5,000 feet).

Tanypremna columbiana Enderlein.

1912. *Pehlkea columbiana* Enderlein; Zool. Jahrb., vol. 32, pt. 1, p. 15, fig. B.

Male, length, 27 mm.; wing, 18.5 mm.

Hind leg, femur, 15.75 mm.; tibia, 13 mm.

Head yellow; eyes very large, black, almost semicircular; occiput somewhat infumed. Front narrow, half as broad as the diameter of the eyes. Antennæ very small and short, about 1.75 mm. long, dark brown, the basal segments yellow. Palpi black, the apical segment with the exception of the base brownish yellow. Nasus long, pubescent at the end and somewhat propped.

Thoracic dorsum dark brown, sternites, pleuræ and coxæ bright brownish yellow; humeral angles of the præscutum bright brownish yellow; a similar spot before the wing-base. Before this latter a rather broad brown band extends from the margin of the thoracic dorsum through the middle of the mesopleuræ, ending on the meso-coxæ which are thus infumed on their outer face. The sides of the prothorax brown, fore coxæ browned on their outer face. Legs with the trochanters bright yellowish, hind femora dark brown, pale yellowish at the base; tibiæ dark brown, the basal eighth yellowish white; first tarsal segment black, the second yellowish white; the remaining segments as well as those of the fore and middle legs broken off. Abdomen long, brown, the tip somewhat enlarged and darkened, the incisures rather brightened. Halteres greyish black, pedicel very long, brownish yellow and with yellowish pubescence. Wings rather narrow at the base for a rather long space, very narrow; bright brownish, a brown spot at the base of the radial fork, a rounded blackish brown spot at the stigma, the caudal veins of cell 1st M_2 , the basal deflection of Cu_1 seamed with brown, the supernumerary cross-vein between M and Cu broadly seamed with brown; proxima of the base of M a small hyaline spot. Membrane strongly red to green iridescent.

Distribution.—Colombia, Hacienda Pehlkea.

Translated from the original description.

Enderlein's figure shows a typical *Tanypremna* with the exception that the tip of R_1 is omitted in the figure; whether it is also lacking

in the type is another question but if such is the case its disappearance may be accounted for by atrophy. In any case there is a considerable error in Enderlein's interpretation of the veins in the radial field of the wing; the vein labelled R_1 should, of course, be R_2 , the part spoken of as the radial cross-vein is the basal deflection of R_2 and the part called R_{2+3} is R_3 alone. The wing is shown in fig. 3, taken from Enderlein's original description of the species.

Tanypremna regina new species.

Large species, wing of the male, 22 mm.; wing heavily marked with brown; supernumerary cross-veins in the basal cells of the wing; tibiae white at the base.

Male, length, 28.2 mm.; wing, 22 mm.; abdomen, 23.5 mm.

Fore leg, femur, 12.7 mm.

Hind leg, femur, 15.7 mm.; tibia, 15.1 mm.; metatarsus, 24.8 mm.

Frontal prolongation of the head very short, the nasus long and slender, dark brown; sides of the rostrum more yellowish; palpi dark brownish black. Antennae with the two basal segments light yellow, the flagellum broken. Front light sulphur-yellow; vertex and occiput dark brown, paler along the inner margin of the eyes and with a narrow median line.

Pronotum with the scutum narrow and high, projecting dorsad as a sharp collar, the scutum dark brown, remainder of the pronotum yellow. Mesonotal prescutum light yellowish brown with four darker brown stripes, the middle pair being longest, narrowed in front and behind, very dark brownish black on the extreme cephalic margin; lateral stripes shorter, beginning at the pseudosutural foveae and running caudad to the suture, connected with the middle stripes except behind; scutum and scutellum broken; postnotum dark brown, more yellowish medially behind. Pleurae yellowish with a green caste, a small oval brownish black spot behind the head at the end of the pronotal scutum; a broader dark brown mark running from the base of the wing ventrad to the base of the mesocoxa whose posterior face it suffuses. Halteres long, slender, green in color. Legs with the coxae light brownish yellow except the dark mark on the mesocoxa described above; trochanters greenish; femora brownish yellow, the tip broadly dark brown; tibiae (only the posterior pair remaining) with the extreme base white and having a decided green caste, remainder of the tibiae dark brown; the first tarsal segment pale, almost whitish, basally soon darkening to a light brown that includes the remainder of the tarsi. Wings subhyaline in the radial and medial cells, cell *C* brighter, more yellowish, the anal cells greyish brown, a row of brown blotches in cells *R* and *M*, each one surrounding the spur of a cross-vein, there being about five in cell *R* and three in cell *M*; the cord is seamed with darker brown as are also most of the veins and deflections of veins; stigmal spot a little darker brown. Venation as in figure 4; the presence of a supernumerary cross-vein in the basal cells is a feature that, in this subfamily of crane-flies, occurs only in the Dolichopezini; the numerous spurs of cross-veins in the basal cells is a very remarkable feature.

Abdominal tergites reddish brown, the apex of each segment narrowly paler, greenish white, the apical tergites darker brown; lateral margin of the tergites narrowly dark brown. Sternites light yellow, the extreme apices of the sternites darker, the apical sternites uniformly darker brown.

Distribution.—Colombia, Cordillera Central.

Holotype, female, near La Vega which is about 12 miles north of Almaguer, March 6, 1912, at an altitude of about 7,000 feet. (John Thomas Lloyd, coll.)

This species is part of the Lloyd collection of Andean insects; the craneflies of this collection have been discussed in an earlier paper (Journ. N. Y. Ent. Soc., vol. 21, Sept., 1913). This specimen was not included in that article because it was in papers with butterflies and so was overlooked until very recently.

There can be but little doubt but that this fly is quite greenish in its living state as shown by the presence of decided green tints on the halteres, legs and thorax. Other species of this genus suggest this same condition to a much less degree. This form is by far the most beautiful of all the species described and it is believed that the specific name is not inappropriate. The presence of the numerous spurs of veins in the basal cells of the wings is quite remarkable. Since these spurs are surrounded by dark markings in every case, I believe these remnants to be constant or nearly so, and Dr. Needham and Dr. Johannsen who examined the wing, are of the same opinion. This presence of a dark marking about a vein or spur seems at first glance to be a trivial character but it is my belief that it is a character upon which considerable stress must be laid,—that is, that dark markings when present on a wing nearly always surround veins and the presence of a brown blotch in a cell may well indicate the position once occupied by a vein.

MEGISTOCERA Wiedemann.

1821. *Mackistocera* Wiedemann; Dipt. Exot., p. 41.

1828. *Megistocera* Wiedemann; Aussereur, zweifl. Ins., vol. 1, p. 55.

The genus *Megistocera* contains a small restricted group of flies having a tropicopolitan distribution. There are about three species in the Old World and these are remarkable in the possession of enormously elongated antennæ in the male sex so far as known; the single New World form has short antennæ in both sexes.

CHARACTERS OF THE GENUS.

Frontal prolongation of the head rather long, the nasus prominent, with a bunch of long hairs at the tip. Terminal segment of the palpus elongate, whiplash-like. Antennæ rather long, at least as long as the head, the scapal segments enlarged, the flagellar segments six in number, elongate-cylindrical; in the New World species the antennæ are about as long as the head, in the males of the Old World forms (this sex of *M. bicauda* Speiser of Africa not yet described) the antennæ are enormously elongated. Eyes with delicate ommatidia; the vertex rather approximated between the eyes.

Pronotum not produced dorsad into a narrow plate as in *Tanypraemna*. Mesonotal præscutum not exceedingly gibbous or projecting over the head. Halteres rather long, the knob small. Legs very long and slender, especially the tarsi. Wings with the cross-vein *m-cu* present and long; basal deflection of R_{2+3} assuming a position that is nearly vertical or perpendicular. The Old World *fuscana* Wiedemann has a venation that is quite similar to that of our American form except that the cell 1st M_2 is much smaller and cell 2nd A very much broader.

Abdomen rather short, the male hypopygium simple; the valves of the ovipositor powerful, the lower valve arcuated basally, the lower valves appressed against the upper pair.

Megistocera longipennis Macquart.

1838. *Tipula longipennis* Macquart; Dipt. Exot., vol. 1, pt. 1, p. 57, pl. 5, fig. 1.

1878. ?*Longurio longipennis* Osten Sacken; Cat. Dipt. N. Am., Ed. 2, p. 37.

1885. *Tipula longipennis* Röder; Stett. Ent. Zeit., vol. 46, p. 338.

1885. *Tipula tenuis* v. d. Wulp; Notes Leyden Museum, vol. 7, p. 7.

1885. *Tipula tenuis* v. d. Wulp; Tijdschr. voor Entom., vol. —, p. 85, pl. 4, fig. —.

1886. *Megistocera longipennis* Osten Sacken; Berl. Ent. Zeit., vol. 30, p. 161.

1902. *Megistocera longipennis* Kertész; Cat. Dipt., vol. 2, p. 264.

1902. *Tipula tenuis* Kertész; l. c., p. 309.

1907. ?*Megistocera tenuis* Needham; Rept. Soc. Ent. N. Y., p. 212.

1909. *Megistocera longipennis* Johnson; Proc. Bost. Soc. Nat. Hist., vol. 34, p. 123.

Male, length, 10 mm.; wing, 15.6 mm.

Middle leg, femur, 11.2 mm.; tibia, 10.6 mm.; metatarsus about 26 mm.

Female, length, 14.3 to 15 mm.; wing, 16 to 16.4 mm.

Fore leg, femur, 7.7 mm.; tibia, 8.6 mm.; metatarsus, 8.1 mm.

Middle leg, femur, 11.5 mm.; tibia, 10.6 mm.; metatarsus, about 24 mm.

Hind leg, femur, 10.5 mm.; tibia, 8.8 mm.; metatarsus, about 25 mm.

Frontal prolongation of the head short, light brown, the nasus pale with the apical brush of hairs dark, palpi black. Antennæ with the basal segments light yellow, the flagellar segments brownish black. Front dull yellowish brown, the vertex and occiput grey.

Mesonotum brownish grey, the lateral margin of the præscutum paler grey bordered interiorly by a narrow blackish line which is waved at the pseudosuture; scutum brownish grey with a brown blotch on each lobe; scutellum pale brown, on the sides dark brown and more shiny; postnotum light brown, more fuscous laterally. Pleuræ pale yellowish brown with a whitish bloom; a rounded shiny black spot at the dorso-cephalic angle of the mesoepisternum. Halteres pale brown, the knob dark brown. Legs with the coxæ pale, the outer faces somewhat browned. Wings whitish, veins brown; stigma conspicuous, oval, brown. Venation as in fig. 5.

Abdominal tergites dark brown, the extreme lateral margins broadly pale, the dorsum variegated with paler, the basal segments being paler medially, the apical four or five segments with the pale spots in two rows one on either side of the middle line; sternites pale.

Distribution.—Florida, Lake Okeechobee; report by Mr. C. W. Johnson from the Mus. Com. Zool., I have examined this same specimen on two different occasions and there can be no doubt as to the identity. Little River; Nov. 30, 1912, one male found in a spider's web by Mr. Knab. Cuba, Macquart's type. Porto Rico (Röder), Trinidad, June 13. Two males, three females, taken by August Busck; U. S. National Museum. British Guiana, Bartica, Dec. 5, 1912 to Jan. 18, 1913. Mallali on the Demerara R., Mar. 20, 1913 (Parish); collection of the author. Dutch Guiana, Van der Wulp's type of *tenuis*. Brazil, female from Ceara in Museu Rocha. Paraguay, Pedro Bay. April, H. H. Smith, collector; part of the Williston collection in the American Museum of Natural History in New York City.

EXPLANATION OF PLATE V.

- Fig. 1. Wing of *Tanypremna longipes* Fabricius.
Fig. 2. Wing of *Tanypremna opilio* Osten Sacken.
Fig. 3. Wing of *Tanypremna columbiana* Enderlein (after Enderlein).
Fig. 4. Wing of *Tanypremna regina* n. sp.
Fig. 5. Wing of *Megistocera longipennis* Macquart.

NEW BEES OF THE GENUS *HALICTUS* (HYM.)
FROM UNITED STATES, GUATEMALA
AND ECUADOR.¹

BY MARION DURBIN ELLIS,

BOULDER, COLORADO.

Below are presented the descriptions of six new bees belonging to the genus *Halictus* (*Chloralictus*). Two of these species, one from Wisconsin and one from New Mexico have the abdomen amber yellow and show no close affinities with the remaining four from tropical America. These last four species together with *H. exiguus* Smith and *H. deceptor* Ellis, have several characters in common and seem to be closely related. They show more or less distinct resemblance to the species related to *H. zephyrus* Smith, a common form in the United States. Among the species most like *H. zephyrus* is *H. umbripennis* Ellis, found in Guatemala. This species is however a very distinctive form of a uniform olive color with fuscous clouded wings and is not to be confused with the six much smaller species here considered. These six bees are all small being 5 mm. or less in length; all except *H. deceptor* have the facial quadrangle almost, if not quite, as broad as long; in each the punctures of the mesonotum are more crowded about the parapsidal grooves than elsewhere, the basal area of the metathorax is without a rim truncating the lateral plicae, the wings are brownish and the abdomen is very shiny, especially

¹ The specimens upon which these descriptions are based are part of the collections of Professor T. D. A. Cockerell. I wish to thank Professor Cockerell for help and direction in the present study, undertaken in the zoölogical laboratory at the University of Colorado.





the disc of the first segment which is often quite impunctate. These species may be separated from one another by the following key:

- a. Punctures of the mesonotum very fine and widely scattered in the broad area on either side of the median groove.
 - b. Hind legs and tarsi of the other legs light brown; abdomen dark brown, the margins of the segments testaceous; clypeus short, extending very little below the eyes; tegulae and stigma testaceous; margin of the basal area of the metathorax not elevated near the middle.
 - H. exiguus* Smith.
 - bb. Legs dark brown or black, tarsi sometimes lighter; abdomen piceous, the broad margins of the segments not testaceous.
 - c. Clypeus somewhat produced, about one-half its length extending below the eyes; tegulae almost colorless testaceous; stigma light yellowish brown; tarsi rufo-testaceous. *H. tropicior* n. sp.
 - cc. At least two thirds of the clypeus produced below the eyes; stigma and tegulae dark brown. *H. exiguiformis* n. sp.
- aa. Punctures of the mesonotum quite close and coarse (*i. e.*, as compared with other small bees).
 - d. Head and thorax blue-green; stigma and tegulae very dark brown.
 - e. Posterior margin of the basal area of the metathorax not elevated; facial quadrangle longer than broad; abdomen shiny black.
 - H. deceptor* Ellis.
 - ee. Basal area of the metathorax narrow, the outer margin very slightly elevated on either side of middle; facial quadrangle as broad as long; clypeus rather narrow, produced almost its entire length below the eyes; abdomen black with dark metallic green reflections. *H. hypochlorus* n. sp.
 - dd. Mesonotum bright golden green, head and remainder of the thorax olive green; stigma and tegulae yellowish testaceous; posterior margin of the basal area of the metathorax very slightly elevated on either side of the middle; facial quadrangle a little broader than long, clypeus produced for about half its length below the eyes; abdomen dark brown with faint olive green reflections.
 - H. chrysonotus* n. sp.

Halictus tropicior new species.

Female 5 mm. or a little more. Head and thorax dark metallic green, abdomen dark brown, the broad margins of the segments shading to somewhat lighter brown near the edge. Facial quadrangle almost as broad as long, narrower below, very closely punctured except on the clypeus and the supra-clypeal area, clypeus blackish and shiny with a few coarse punctures, supra-clypeal area very dark green with some slight coppery reflections, faintly lineolate and with a few rather fine punctures; flagellum, especially the under side, yellowish near the tip; mesonotum shiny, the punctures very fine and scattered, more crowded about the parapsidial groove; disc of the metathorax

without a rim; lateral areas of the metathorax bulging a little beyond the margin of the basal area, basal area sharply lineolate and with a few simple but rather strong plicæ, margin of the basal area shiny, slightly elevated across the middle; wings pale brownish, stigma and nervures light brown, costal nervure darker; tegulæ testaceous, appearing almost colorless; legs blackish, the knees and tarsi clear red brown; abdomen broad and shiny, the disc of the first segment very finely lineolate but with only very minute punctures, the other segments finely but coarsely punctured; pubescence very scant, buffy on the legs, pale yellowish around the anal rima.

Habitat.—Quirigua, Guatemala. 1 (= type), at flowers of *Ipomæa quinquefolia* Griseb. February 20, 1912 (Mrs. W. P. Cockerell).

The paucity of pubescence may be correlated with the age of the specimen as indicated by the somewhat tattered and worn condition of the wings.

***Halictus exiguiformis* new species.**

Female 5 mm. Head and thorax dark metallic green, abdomen piceous, the broad margins of the segments dark brown. Facial quadrangle almost as broad as long, almost the entire length of the clypeus produced below the eyes, the lateral area of the face sharply lineolate but not so closely punctured as in *H. tropicior* Ellis; supraclypeal area sharply lineolate, with fine scattered punctures, clypeus, except for a narrow black margin, green like the rest of the head; flagellum lighter below; mesonotum finely lineolate, the punctures fine and widely scattered on either side of the median groove, crowded on either side of the parapsidial grooves and along the posterior margin of the segment; metathorax short and rather narrow, no rim around the disc, basal area lineolate, with a few short simple plicæ, the posterior margin not at all elevated; tegulæ dark brown; wings distinctly brownish, nervures and stigma dark brown; legs piceous, shading to reddish brown on the tarsi; abdomen shiny, the disc of the first segment almost impunctate, disc of the following segments with very fine punctures; pubescence scant, pale grayish buff on the sides of the abdomen, around the anal rima, on the mesonotum and on the legs, more grayish below.

Habitat.—Guayaquil, Ecuador. 1 (= type) (von Buchwald, Alfken collection number 23).

***Halictus hypochlorus* new species.**

Female 5 mm. Head and thorax dark metallic green, more or less shiny; abdomen blackish with dark metallic green reflections. Facial quadrangle about as wide as long, clypeus produced half its length below the eyes, lateral areas of the face and supraclypeal area rather shiny; mesonotum not sharply lineolate, a little shiny but rather coarsely and very closely punctured, the

punctures less crowded on either side of the median groove; disc of the metathorax without a rim, basal area coarsely lineolate and with numerous short simple plicæ, concave in the middle, the posterior margin broad, rounded and shiny, elevated near the middle but not forming a rim truncating the most lateral of the plicæ; tegulæ dark testaceous; wings slightly brownish and dusky, stigma and nervures brown; legs black, knees and tarsi of the last two pairs of legs light brown; abdomen very shiny, disc of the first segment impunctate, margins not lighter than the rest of the segments; pubescence scant, pale yellowish gray on the legs where it is most abundant.

Habitat.—Guayaquil, Ecuador. 1 (=type) May–June, 1913 (C. T. Brues).

Halictus chrysonotus new species.

Female 5 mm. Head and thorax dark metallic green, mesonotum golden green, abdomen very dark brown to almost piceous, with distinct olive green reflections; facial quadrangle almost if not quite as broad as long, clypeus rather narrow at its base, produced half its length below the eyes, lateral areas and the supraclypeal area sharply lineolate; distal two-thirds of the flagellum ochraceous; mesonotum rather broad, closely and rather coarsely punctured, the punctures more crowded about the parapsidal grooves than elsewhere, sharply but finely lineolate; scutellum more shiny than the mesonotum, the punctures finer, less distinct and not so close; disc of the metathorax without a rim, the basal area sharply narrowed on the sides, forming a truncated triangle with rather sharp rugose plicæ radiating from the basal margin of the segment, the outer margin of the basal area very slightly elevated on either side of the middle; wings a little brownish, tegule and stigma bright testaceous, nervures dark brown; legs black, knees and tarsi bright brown, inner spine of the hind tibia with but three teeth, the first almost half as long as the spine, rounded at the free end and almost cylindrical; abdomen very shiny, the disc of the first segment almost impunctate, very dark brown shading into red brown on the broad margins of the segments, the whole with elusive olive green reflections; pubescence scant, light brownish on the legs, grayish below.

Habitat.—Guayaquil, Ecuador. 1 (=type), May–June, 1913 (C. T. Brues).

Halictus graenicheri² new species.

Female 5 to 5.5 mm. Head and thorax olive green; abdomen clear, reddish amber-color, without darker clouds or markings; margins of the segments pale testaceous. Facial quadrangle a little longer than wide, but not elongate, perceptibly narrowed below; distal half of the clypeus black; hair on the lateral areas of the face rather abundant and of a dirty white color; mesonotum sharply lineolate, with moderately coarse, sharp, close punctures; no rim around the truncation of the metathorax; basal area of the metathorax rather broad and quite concave, its distal margin elevated across the middle so as to

² Dr. S. Graenicher, Public Museum, Milwaukee, Wisconsin.

form a short, narrow rim which does not truncate the lateral plicæ; rugæ rather strong; tegulæ testaceous; wings hyaline, stigma pale, nervures dark testaceous; legs dark brown, tarsi and knees a little lighter, reddish to dark testaceous; abdomen somewhat shiny, all of the segments except the first with rather abundant, short, buffy pubescence; pubescence on the legs somewhat darker and more abundant, and that on the sides of the thorax paler and longer.

This species is quite similar to *H. nymphalis* Smith from Florida, from which it is separated by the fuscous bands on the abdomen and the finer punctures on the mesonotum of *H. nymphalis*. *H. graenicheri* also resembles *H. testaceus* Robertson which however lacks the short rim across the basal area of the metathorax. This partial rim suggests the three species *H. clematisellus* Cockerell, *H. mesillensis* Cockerell and *H. vicerecki* Crawford, which also have yellow abdomens. These species may be distinguished by their abundant pubescence, which is snow white in the first two and golden yellow in the latter.

Habitat.—Genoa, Vernon County, Wisconsin. 1 (=type) and 1 cotype, July 13, 1911 (Graenicher, Nos. 52738 and 53067).

***Halictus clarissimus* new species.**

Female 5 mm. Head and thorax rather light, somewhat greenish blue; abdomen clear amber yellow, darker at the apex, the margins of the segments yellow. Facial quadrangle about as broad as long, narrowed below; emargination of the eye rather deeper than in most species of this genus; clypeus short, not extending below the eye; clypeus and lateral areas of the face with rather abundant white pubescence; flagellum reddish brown near the tip; mesonotum shiny, the punctures very fine and scattered in the middle, more crowded around and at the anterior end of the parapsidial grooves; wings clear, hyaline; tegulæ, stigma and nervures, except the costal, pale honey color; legs reddish brown, knees and tarsi, except the terminal joint, testaceous; disc of the metathorax without a rim; lateral areas of the metathorax full and shiny, the basal area roughened, its plicæ rather numerous, those in the middle more or less rugose, the lateral ones straight and extending onto the lateral areas; margin of the basal area of the metathorax rounded, shiny and elevated across the middle; abdomen rather shiny but with numerous, very fine, shallow punctures; pubescence thin and whitish, rather uniformly distributed over the abdomen and the sides of the thorax.

This species is placed in a group with *H. zephyrus* Smith although the sculpture of the basal area of the metathorax is not in strict accord with this grouping. *H. clarissimus* resembles *H. pallidellus* Ellis more than any other species. The short clypeus and broad facial

quadrangle distinguish it from all of the species with yellow abdomen except *H. kuntzei* Cockerell which has a green, not blue, head and thorax, and has the facial quadrangle as broad below as above and the eyes scarcely if at all emarginate.

Habitat.—Eddy, New Mexico. 1 (= type) from flowers of *Malvastrum*, April 13 (Cockerell).

THE LIFE HISTORIES OF THE NEW YORK SLUG-CATERPILLARS.—XX.

BY HARRISON G. DYAR,

WASHINGTON, D. C.

The series of papers published in the JOURNAL of the New York Entomological Society, under this title, which ceased in 1899, was subsequently continued in 1907 by an account of an additional species, then just worked out. The species which will be now discussed has not been studied from New York material and there are no actual records of the species occurring in the state, yet the probability is that it does so occur, at least occasionally. In 1883 it was taken in Morris Plains, New Jersey, this year having been apparently a specially favorable one for slug-caterpillars, as I remember that *Phobetron pithecium* was remarkably common that year in New York. Again, *Isochaetes beutenmuelleri*, with a typically southern distribution, was taken on Staten Island in 1901 by Mr. Joutel. With these records, therefore, I am inclined to list *Monoleuca semifascia*, here discussed, as one of the New York slug-caterpillars.

I have been attempting to obtain this larva for the past fifteen years. My first trips to Morris Plains, N. J., in 1898 and 1899, were unsuccessful, as were three subsequent ones to Tryon, North Carolina, where Mr. Fiske had taken adults. In these trips it was sought to find larvæ, and the lack of success led me to suspect some unusual habit or food plant. However, such does not seem to be the case. I simply missed finding the larvæ. On the fourth trip to Tryon, N. C., in 1911, with the light tent described by Mr. H. S. Barber (Proc.

Ent. Soc., Wash., XIII, 72, 1911), I took a female adult. This deposited eggs and the larvæ fed normally upon smooth-leaved trees.

I am under obligations to Dr. L. O. Howard for facilitating my last trip to Tyron.

Monoleuca semifascia Walker.

- 1855. *Limacodes semifascia* Walker; Cat. Lep. Brit. Mus., v, 1151.
- 1869. *Monoleuca semifascia* Grote and Robinson; Trans. Am. Ent. Soc., ii, 187, pl. 2, fig. 63.
- 1883. *Monoleuca semifascia* H. Edwards; Papilio, iii, 25.
- 1891. *Monoleuca semifascia* Dyar; Ent. News, ii, 62, pl. 4, fig. 20.
- 1892. *Monoleuca semifascia* Kirby; Cat. Lep. Het., i, 548, 927.
- 1894. *Monoleuca semifascia* Neumoegen and Dyar; Journ. N. Y. Ent. Soc., ii, 69.
- 1898. *Monoleuca semifascia* Dyar; Proc. Ent. Soc. Wash., iv, 302.
- 1899. *Monoleuca semifascia* Dyar; Journ. N. Y. Ent. Soc., vii, 235.
- 1903. *Monoleuca semifascia* Dyar; Bull. 52, U. S. Nat. Mus., 355.
- 1905. *Monoleuca semifascia* Dyar; Proc. U. S. Nat. Mus., xxix, 370.
- 1906. *Monoleuca semifascia* Dyar; Biol. Stud. by pupils of W. T. Sedgwick, 11.

LARVA.

- 1911. Riley, Proc. Ent. Soc. Wash., xiii, 210.

SPECIAL STRUCTURAL CHARACTERS.

Dorsal and lateral spaces broad, subventral space narrow, contracted; ridges very slight, the lateral the most distinct, approximate to the subventral. Fleshy horn-like processes at first equal, later the terminal ones elongate, the others short; in stage I bearing three setae each, after first molt the subdorsal and lateral rows covered with numerous urticating spines; subventral row rudimentary. The subdorsal horns are long on joints 3 and 13, short and equal on the rest; lateral horn long on joint 3, short on the rest, no lateral horn on joint 5, the spiracle moved up in its place. Depressed areas feebly developed, usually only the glandular centers visible and only those of the centers of the dorsal and lateral spaces visible. Skin at first smooth, finally with rather dense colorless granules. Caltrop patches appear on the lateral horns about stage VII and are well developed in the last stage, when four patches of dense spines appear above the subdorsal horns of joint 13 and lateral of 12 on each side.

The eggs are elliptical, flattened, but of thickness equal to half of the narrow diameter, laid in masses and covered with hair-like filaments from the parent moth.

AFFINITIES, HABITS, ETC.

The larva belongs to the "tropic spined Eucleids" section 2, type 3 of my synopsis (Journ. N. Y. Ent. Soc., VII, 236), nearly allied to *Adoneta*, *Euclea* and *Sibine*. The spine-patches are present as in these genera, both the caltrop spines of the lateral horns and the terminal patches of *Euclea* and *Sibine*. The coloration is a rather subdued warning color, more conspicuous than in *Euclea* but less so than in *Parasa indeterminata*, to which it is more nearly allied in pattern. An unexpected modification is seen in the length of the horns, which are all equal, not irregularly shortened, as in the genera cited. This might appear at first sight a character of generalization, allying the species to lower forms such as *Natada* and *Sisyroscia*, but this relationship is negated by the structures above cited and the equality of the horns is undoubtedly secondarily acquired.

But by far the most remarkable character is that of the eggs. These are typically those of the Megalopygidae and not those of the family Cochlidiidae at all. All our other Cochlidiidae have flat, transparent, wafer-like eggs, similar to but flatter than those of the Tortricidae. The Megalopygidae, however, have eggs of appreciable thickness covered with hairs, exactly like those of *Monoleuca*. The Megalopygidae are evolutionally a much lower group, from which the Cochlidiidae may be directly derived. The Megalopygid type of egg has been supposedly already replaced by the new type in the original ancestor of the Cochlidiidae, and its sudden reappearance in one species of Cochlidiidae high on a specialized branch of the genealogical tree is certainly surprising.

Very little is known about the life history of *Monoleuca semifascia*. I have never seen a larva in nature, and the late Dr. Riley, who appears to have been the only person known to have seen one, failed to record the food plant on which it was sent to him.¹ My larvæ fed readily on nearly every leaf offered them and were mostly bred on wild cherry and persimmon. It is presumable that the larvæ are semi-gregarious when young, scattering when older, much as with *Sibine*, and that they will feed on many bushes or low-growing trees with smooth leaves. There is but one brood a year, the adults emerging from overwintering cocoons about the middle of July, the larvæ

¹ Very recently a specimen has been received from Rosharon, Texas, bred from pecan by Mr. G. W. Coles.

growing slowly and maturing in September. The cocoons are probably spun in crevices on the ground, possibly in bark, as they are rather weak in structure and not adapted to be formed among leaves or loose earth.

The distribution of the species appears to be from New York as northern limit southward to the Gulf of Mexico. Recorded localities are New Jersey, West Virginia, North Carolina, Missouri and Texas.

The other three described species of *Monoleuca* are all known only from central Florida.

CRITICISM OF PREVIOUS DESCRIPTIONS.

No description of the larva was extant, but recently in looking over the notes at the Bureau of Entomology, Department of Agriculture, I found a description by Dr. Riley, which I had published in the Proceedings of the Washington Society. Dr. Riley's description is excellent for one of its brevity. He did not fail to note the obvious relation of the larva to that of *Euclea delphinii*. The even more obvious relation to *Parasa indetermina* is not mentioned; but I think that larva was unknown to Dr. Riley, at least with its identification complete.

DESCRIPTION OF THE SEVERAL STAGES IN DETAIL.

Egg.—Elliptical, gently flattened, uniform, shining pale yellow. Size $.8 \times .6 \times .3$ mm. Laid in patches of 20 or more, the eggs well spaced, separated from each other by nearly the diameter of an egg and covered loosely with short, stiff, white hairs that do not conceal the eggs but stand up loosely some .5 mm. Surface rather coarsely flatly hexagonally marked, without lines. The hair covering is composed chiefly of short white hairs, pointed at both ends, straight or slightly bent at one end.

Stage I.—Head rounded, pale yellow, with large black coelli and projecting mouth. Thoracic feet small, pointed, normal, pale yellow. Body short, thick, rounded, normal, with two rows of short conical tubercles with three setæ from each. All pale yellow. The larva is more elongate when walking. Sides perpendicular, dorsum broad, slightly depressed centrally. The tubercles form II horns in the upper row, 9 in the lower, each with three rather long, fine, pale hairs with minutely bulbous tips. Later the body is yellow, the horns white,

the subdorsal setæ black. Length, 1.1 mm. Duration of the stage, one day. The larva does not feed.

Stage II.—Elongate, the ends rounded, dorsum flattened, sides oblique, subventral space retracted; subdorsal and lateral ridges rather prominent, the horns subspherical, all alike, bearing many stinging spines; some soft hairs anteriorly and from the lateral warts; pale yellow, the tips of the spines only black. Later a brown infiltration between the horns, especially on the anterior end. This end is a little higher, the body sloping posteriorly. Length .9 to 1.8 mm. The larva often sits with the body curved like *Adoneta*. Duration of the stage 6 days.

Stage III.—Sides parallel, the ends rounded, flattened; dorsal and lateral spaces rather narrow; horns rounded, subspherical, moderately large, those of subdorsal row on joints 3 and 4 a little larger, also the lateral horn on joint 4 slightly enlarged; horns and subventer yellow. the horns with dense short spines, their tips black, especially on the subdorsals. Dorsum and lateral space infiltrated with dark red. The body arches a little behind, flat before. Later the red infiltration concentrates along the subdorsal ridge and on joints 3 and 4, but is still diffuse. Length, 1.7 to 2.5 mm. Duration of the stage 6 days.

Stage IV.—Moderately flattened, sitting curved often; rather long, the posterior end a little depressed, sides parallel; dorsal and lateral spaces subequal, subventral space retracted. Horns subspherical, the subdorsals of joint 3 a little pointed; spines numerous but short and weak. Pale yellow; a narrow dorsal red line and some dull red in a band under the subdorsal ridge; joints 3 and 4 all infiltrated with red dorsally. Dorsal depressed spaces (1) show plainly as pale dots defined by the red color. The red band under the subdorsal ridge really occupies the lateral space nearly entirely and defines the lateral depressed spaces (4), which are pale and cut into the red band. Later the dorsum becomes all gradually infiltrated with reddish. Length, 2.5 to 3.8 mm. Duration of the stage, 6 days.

Stage V.—Rather strongly flattened, but thicker than *Euclea*, the sides parallel except posteriorly, rounded anteriorly; subventral area rather prominently rounded, bulging. Horns short, equal, large, the spines contiguous, but moderate and not darkly colored; subdorsals of joints 3 and 13 a little larger than the others. Dull yellow, the horns

with a trace of vermilion within, under a lens; dorsal space filled with dark red-brown, of which a straight dorsal line is most distinct, the glandular depressed spaces (1) appearing as large pale yellow dots; outline of the dorsal space a waved line, the expansions between the horns; upper half of lateral space dark red-brown, the edges a little heavier and the centers shining slight pale spaces; region below dull yellow, the row of lateral horns contrasting by its slightly lighter shade. Horns strongly tubercular, the spines numerous, long and black-tipped, but fine and inconspicuous. Later the vermilion in the horns becomes more distinct, but the general effect is dull rusty brown. The dark brown breaks through the subdorsal ridge between the horns of joints 3 and 4 broadly and between 12 and 13 narrowly. A narrow black line appears above the lateral horns. Length, 3.8 to 6 mm. Duration of the stage, 6 days.

Stage VI.—Elongate, the ends rather rounded, dorsal and lateral spaces moderate, subequal, subventer retracted. Horns all subequal, the subdorsals of joints 3 and 13 a little longer, also the lateral of joint 3 longer and conical, the others subspherical. Dorsum purple with elongate white patches on depressed spaces (1), dividing into straight dorsal and wavy subdorsal purple lines; subdorsal ridge pale yellow with central vermilion line, the horns vermilion tinted; horns of joint 3 brownish red. Lateral space with pale patches over depressed spaces (4), pale yellow below, leaving a purple line above which is waved, and a central one which is straight; a livid purple wavy line on each side of the subdorsal ridge; joints 3 and 4 solidly purple shaded in the interspaces. Impressed glandular dots visible in dorsal space. Skin rather densely granular shagreened. Length, 6 to 8.5 mm. Duration of the stage 6 days.

Stage VII.—Elongate elliptical, dorsum gently arched, moderately broad, sides oblique, subventer retracted. Horns of joint 3 and the subdorsals of 13 slender, conical, rather long and dark vinous, the others rounded, subspherical, vermilion, in a slender vermilion line on the ridge. Surface pale opaque yellowish; dorsal and lateral spaces with three purple brown lines, the center one straight, the side lines waved; two similar lines in lateral space. Horns well spined (1) and (4) glandular dots darkish. Skin granular shagreened. Clear spaces on the upper sides of all the lateral horns with a few caltropes, the spaces above the subdorsal of 13 and lateral of 12 largest and

without caltropes. Length 8.5 to 13 mm. Duration of the stage 6 days.

Stage VIII.—Elongate elliptical, dorsum gently arched, moderately broad, sides oblique, subventer retracted. Patches of black spines present above the long subdorsal horn of joint 13 and the short lateral one of joint 12; caltrope patches at the bases of the lateral horns on joints 6 to 11. Joint 3 stained with purple, its horns long, tapered and vinous purple. Subdorsal and lateral ridges vermilion lined, the rounded horns short and equal. Dorsum pale pink, the three lines nearly black, the middle one straight, the side lines waved; glandular spots (1) dark with raised granular edges; a yellowish border to the subdorsal ridge. Sides less pinkish, the central line broken and wavy, rather purplish than black, the upper and lower lines black, the upper well waved, the lower less so. Subventer carneous with two blackish lines, the subventral edge reddish. The long subdorsal horn of joint 13 is purplish as also the laterals of 4 and 6 slightly. Skin rather densely clear granular. Spines on the horns white with black tips. Length 13 to 17 mm. Duration of the stage 3 days (in hot weather).

THE EGGS AND NYMPHAL STAGES OF THE DUSKY LEAF BUG *CALOCORIS RAPIDUS* SAY.

BY R. L. WEBSTER AND DAYTON STONER.

AMES, IOWA.

In the course of some work on potato insects, being carried on at the Iowa Experiment Station, a few notes were accumulated on the dusky leaf bug, *Calocoris rapidus* Say, which occurred rather abundantly on potato plants at Ames in 1913. The egg, which had not been previously observed, was found, and descriptions of the five nymphal stages were prepared. These notes are from the files of the entomological section of the Iowa Agricultural Experiment Station at Ames.

INJURY TO POTATOES.

During July, 1913, these insects were fairly common in potato fields in company with the tarnished plant bug, *Lygus pratensis* Linné, but no special attention had been given either insect. July 18, when the writers were collecting in a small potato patch, it was noticed that certain plants were wilted down at the growing tips. Frequently one or more nymphs or adults of *Calocoris rapidus* were associated with this injury, found with the beaks inserted in the partially withered stems.

In order to verify the assumption that the wilting was caused by this insect 25 adults were placed on a healthy potato plant in the insectary July 19. Two days later the same characteristic injury was noted on these plants; the wilting down of the more tender leaves where the insects preferred to feed. Other similar insectary experiments showed without doubt the nature of the injury to potato.

Although the insect seems never to have been recorded as feeding on potatoes, it was abundant enough to attract attention in this instance. However, it may hardly be considered as more than of secondary importance.

LIFE HISTORY NOTES.

Since observations on the insect did not begin until late in July, the following notes concern only the late summer and early fall. Unless otherwise indicated observations were made on potato plants. The adults were found most abundant during July. On August 6 adults were still common, but many nymphs were also present, most of which appeared to be past the second nymphal stage.

In a note by Mr. Stoner under date of August 8 adults are recorded as being less common. Dissection of several females collected on this date, however, revealed the fact that eggs were still present in the oviduct, in advanced stages of development, probably still being deposited. Mr. Stoner found 8, 15 and 17 eggs in three females dissected.

August 15 nymphs were abundant, much more so than the adults. Stage V was most common. In the insectary stage I nymphs were then present and eggs were still hatching. On August 20 conditions were practically the same.

In September adults became more common, although the older

nymphs were present in some numbers. October 1 adults were common on some cabbage plants and one nymph was found on that date.

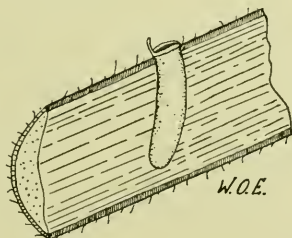
From these notes it is evident that a new generation appears in late July and early August, maturing during September. The winter is evidently spent in the adult stage.

There are probably two generations in this latitude, as Forbes has suggested. These observations, then, deal with the second generation, and the adults of the first late in July.

THE EGG.

Adults confined in insectary cages readily deposited eggs in potato stalks. Usually these were placed in the tissue at the junction of the smaller stems with the main stalk and in the axils of the leaves. They were also deposited, to a considerable extent, on the main stalk for its entire length.

Usually eggs were placed singly; sometimes several were found in close proximity, or even adjacent. As a rule the eggs were placed at right angles to the long axis of the stalk; sometimes at an acute angle to the stalk, or even almost parallel, though imbedded in the tissue.



From the exterior it was possible to detect the presence of the egg by the ovate cap, which is provided with a short spine, all that is visible.

Following is given a description of the egg.

Egg.—Cylindrical, slightly curved; exposed end with a narrow truncate cap which projects for its entire width outside the epidermis of the plant; opposite end broadly rounded; surface very finely punctate. General color of fresh eggs yellowish green. Length 1.17 mm., width .31 mm. (average of 9 specimens).

Cap.—Generally ovate in outline, from exterior of plant; sometimes with sides slightly concave. Margin of cap finely serrate on edge; ridged on inner side, the ridges corresponding to the serrations. A series of hairs, arranged quite regularly, joins the lower, outer edge of the cap with the pellicle and apparently holds the cap in place. Color within the margin, yellowish green. (This may vary with the state of development of the egg).

The cap bears a short, stout spine which is attached on the concave side of the egg. The spine is rigid, but flexible at the base, where it joins the margin. Spine enlarged slightly and rather abruptly at tip and projects for its entire length outside the epidermis of the plant. Color pale reddish; length .16 mm.

According to insectary records, from 11 to 13 days were required for eggs to hatch; this in the latter half of July and the first half of August.

THE NYMPHAL STAGES.

Dr. Forbes¹ studied this species as a strawberry insect and published descriptions of certain of the nymphal stages. Forbes, however, was under the impression that there were but four nymphal stages, whereas the actual number is five. The stages described by him as II, III and IV are, in reality, III, IV and V. Descriptions of the five stages follow.

Stage I.—Head and prothorax brownish; meso- and metathorax yellowish, sometimes greenish; abdomen pale clay yellow; body sparsely setaceous, setæ black; length 1.4 mm.

Head including eyes slightly wider than prothorax; eyes deep rose; antennæ pale cadmium yellow, except last segment, which is deep red, white tipped and with a somewhat broader white band at base; sparsely clothed with fine white hairs; beak long, the tip extending well on to the abdomen, color pale cadmium yellow, tip dusky. Prothorax narrower than succeeding segments, about one fourth longer than mesothorax, distinctly margined; mesothorax nearly twice the length of metathorax; metathorax short.

Abdomen ovate, broadest before middle, pale clay yellow except on margins and apex of venter, where it is pale cadmium yellow. Femora pale cadmium yellow, hind pair slightly darker; tibiæ pale

¹ Forbes, S. A., 13th Rep. State Ent. Ill., p. 135, 1884.

clay yellow, dusky at tips; tarsi pale but with the apical fourth dusky; whole leg sparsely clothed with fine white hairs.

Stage II.—Form and color as in stage I, but with a large reddish patch covering most of the abdomen. Length 2.06 mm.

Head and thorax similar to stage I. Prothorax short. Mesothorax slightly longer; metathorax very short; both margined and greenish in color.

Most of the abdomen is reddish, sometimes greenish on first and second segments and also towards caudal extremity; tip red. Abdomen beneath pale green, reddish at sides. First and second abdominal segments shorter than succeeding segments. Femora and hind tibiae reddish; front and middle tibiae pale clay yellow; all the tarsi pale, black tipped.

Stage III.—Form and color in general as in preceding stage. Length 2.6 mm.

Head dragon's blood; eyes purple lake. Antennæ: first segment pale cadmium yellow; second segment the same, darker distally; third, pale proximally, shading into deep red distally; fourth segment as in preceding stages. Prothorax same color as head, except the caudal margin, which is greenish. Mesothorax and metathorax pale green; margined; both very slightly produced caudo-laterad.

Abdomen as in preceding stages. Femora reddish, the hind pair with a narrow pale band near apex; tibiae pale, except hind pair, which is reddish, black tipped; tarsi pale, black tipped.

Stage IV.—Form and color similar to preceding stage, but with the wing pads well developed. Length 3.6 mm.

Head similar to preceding stage. Antennæ: first segment chrome orange; second, pale cadmium yellow, shading into reddish distally; third and fourth segments as in stage III. Mesothorax and metathorax produced into wingpads which reach to or upon the second abdominal segment; wingpads slightly dusky at tips.

Abdomen similar to stage III; first and second segments subequal in length above, laterad and ventrad the first is much compressed, the second much swollen. Color of legs the same as in stage III; femora clothed with fine black hairs; tibiae with many stiff black hairs.

Stage V.—Form elongate oval; general color as in preceding stage, but wingpads conspicuously tipped with dusky or sometimes black. Length 4.6 mm. (average of 10 specimens)

Head burnt sienna, varying to dragon's blood. Antennæ: first segment burnt sienna; second, proximal half pale, becoming deep red distally; third and fourth segments as before. Beak of same color as head, black tipped, reaching to hind coxæ. Prothorax with a transverse band of burnt sienna cephalad; remainder pale green; much broader caudad. Mesothorax and metathorax pale green; wingpads dusky or black at tips and along outer margins, becoming lighter toward base.

Abdomen greenish, with transverse red-brown patch, of which only the caudal portion reaches the sides; tip reddish. Femora reddish with pale mottling. Front and middle tibiæ pale, black tipped; hind tibiæ deep red. Tarsi pale, black tipped.

A few records were obtained of the time spent in the several stages, but none of these are complete. The insects died in the cages, in spite of the care given them. From these few notes it was found that 2 to 3 days were spent in stage I; 2 to 4 days in stage II; 2 to 3 days in stage III; 5 days (one record) in stage IV. No records for stage V were obtained. December 16, 1913.

NEW MEMBRACIDÆ FROM THE EAST INDIES.¹

BY W. D. FUNKHOUSER,

ITHACA, N. Y.

The following new species are representatives of the subfamily Centrotinæ which appears to be the dominant group of Membracidæ in the oriental regions.

For the species from the Philippine Islands I am indebted to Professor C. F. Baker of the College of Agriculture, Los Banos, P. I.

1. *Gargara nigrocarinata* new species.

Black; finely and densely punctate; thickly covered with short yellowish pubescence. Head long; clypeus extending for half its length beyond the inferior margin of the cheeks; eyes reddish-brown; ocelli black, farther from each other than from the eyes and located above a line passing through middle of eyes. Prothorax obtusely rounded in front; lateral angles prominent, pro-

¹ Contribution from the Entomological Laboratory of Cornell University.

jecting beyond the eyes to a distance of half the width of the latter; median carina beginning between the humeral angles, obsolete before them, more pronounced posteriorly and becoming very strong and sharp on posterior process; posterior process high and tectiform, slightly sinuate before, abruptly acute, and extending just to the internal angle of the tegmina; posterior process with lateral carinæ beginning at apex and extending forward near margin as far as middle of exposed part of scutellum. Tegmina clear hyaline, without markings except basal fifth which is densely black and punctate. Underside of body and femora uniformly black; tibiæ and tarsi ferruginous. Type, female. Length, female, 3.5 mm.; male, 3 mm. Width, female, 1.8 mm.; male, 1.5 mm.

Close to *G. nigro-fasciata* Stål but differing in the shape of the posterior process, the shape of the head and the coloration of the wings. It may be recognized by the high black ridge of the posterior process.

Described from one female and two males, one pair taken at Los Banos, P. I., and the other male at Mt. Makiling, Luzon, P. I. All three specimens collected by Professor C. F. Baker.

2. *Gargara brunnea* new species.

Uniform cinnamon-brown; head and femora darker, approaching chocolate. Very finely punctate, covered with fine, silky, scattered yellow hairs. Head very short, inflexed; twice as wide as long as seen from cephalic view; more pubescent than prothorax above; eyes light yellow-white; ocelli same color as eyes, farther from each other than from eyes and located above a line passing through center of eyes. Prothorax low and wide in front; median carina very faint; humeral angles prominent and blunt; posterior process long and narrow, extending somewhat downward, gradually acuminate and extending beyond internal angle of tegmina, apex slightly carinate. Tegmina somewhat opaque, surface finely wrinkled; no markings except at base which is brown and coarsely punctate. Front and middle femora very much swollen; tibiæ and tarsi ferruginous; tibiæ very finely spined. Type, female. Length, 3.7 mm.; width, 2 mm.

Locality: Mt. Makiling, Philippine Islands. Collected by Professor C. F. Baker.

Near *G. tuberculata* Funkh., but smaller, head much shorter, prothorax without markings, and wings without tubercles.

3. *Gargara trifoliata* new species.

All parts of the body uniform brilliant jet black; densely but coarsely punctate and sparsely covered with yellowish pubescence. Head almost twice as broad as long, clypeus very distinct; eyes cloudy, mottled with dark brown; ocelli pearly white, farther from each other than from the eyes and situated above a line passing through center of eyes. Pronotum rather high and convex in front; humeral angles sloping, not prominent; no median carina except

on posterior process; posterior process thick and heavy at base, sharp median and lateral carinae, strongly curved downward, gradually acuminate, reaching to a point midway between internal angle and apex of tegmina. Tegmina densely black for basal two thirds with large trifoliate white spot on this region, base punctate; apical third yellowish-hyaline; tip fuscous. Wings with three apical areas. Underside of body, femora, tibiae and tarsi jet black. Sides of meso and metathorax with thick silvery pubescence. Type, female. Length 8 mm.; width, 4 mm.

Locality: Mt. Makiling, Philippine Islands. Collected by Professor C. F. Baker.

Size of *G. majuscula* Dist., but very distinct in markings and particularly in the peculiar shape of the posterior process of the pronotum. May be easily recognized by its large size and by the large trifoliate white spot on the tegmina.

4. *Gargara attenuata* new species.

Very dark chocolate brown; finely punctate and sparingly pubescent. Head almost as long as wide, slightly rugose, distinct median ridge, pubescence thicker than on pronotum above; eyes yellowish, somewhat mottled with brown; ocelli pearly white, farther from each other than from the eyes, situated well above a line drawn through center of eyes. Pronotum smooth, convex, marked with a black semicircle above each eye, no median carina except on posterior process; posterior process suddenly acuminate at apex, sharply carinate above, curved slightly downward at extreme tip, extending just beyond internal angle of tegmina. Tegmina subhyaline, clouded with ferruginous just behind middle, tip fuscous; veins bordered with fine hairs. Under surface of body and femora, except tips, deep brown. Extremities of femora light, tibiae and tarsi light ferruginous, claws brown. Type, female. Male slightly smaller and darker. Length, female, 3.4 mm.; width, 1.5 mm.

Locality: Banguay Island.

Near *G. robusta* Dist., but smaller, differs in the length and shape of the posterior process and in the fact that the base of the tegmina is not punctate.

I have specimens from this same locality which I determine as *Gargara affinis* Dist., described from Bombay (Dixon), Tenasserim, Calcutta and Myitta (Doherty), and *Gargara robusta* Dist., described from Kurseong, both of which are close to the above species.

5. *Gargara minuta* new species.

Small; black; shining; coarsely punctured; very sparsely pubescent. Head longer than broad, clypeus produced for half its length beyond the line of the cheeks; eyes clear translucent white; ocelli pearly white. Pronotum convex in front; median carina apparent only on posterior process; posterior process

set off from the rest of the prothorax by a deep indentation, lateral and median carinæ distinct, process reaching to internal angle of tegmina. Tegmina reddish, subopaque, base black and punctured, apex almost hyaline. Under parts of body and legs black. Extremity of femora and tarsi flavous-ferruginous. Type, female. Length, female, 3 mm.; male, 2.5 mm. Width, female, 1.6 mm.; male, 1.4 mm.

Locality: Banguay Island.

This is one of the smallest species of the genus which I have seen, some of the males being less than $2\frac{1}{2}$ mm. in length. The species is to be recognized not only by its small size, but by the shining black color and by the clear white translucent eyes.

The male, besides being smaller, shows a broader hyaline area at the apex of the tegmina.

6. *Gargara sumbawæ* new species.

Head, pronotum, except dorsal median carina of posterior process, under surface of body, and femora dark clove brown, almost black. Median carina of posterior process, extremities of femora, tibiæ and tarsi yellowish. Claws brown. Head almost as long as broad, densely pubescent, lightly inflexed; eyes yellowish; ocelli white, almost equidistant from each other and from the eyes. Pronotum convex, humeral angles subacute, median carina obsolete before and very sharp throughout the posterior process; posterior process very narrow, exposing much of scutellum, acuminate, turned slightly upward at extremity, just reaching internal angle of tegmina. Tegmina yellow-hyaline, base brown and punctate, no markings beyond base. Sides of meso- and meta-thorax densely pubescent. Tibiæ with fine spines. Type, male. Length, 4.5 mm.; width, 2 mm.

Locality: Sumbawa Island.

Near *G. brunnea*, but distinct in shape of head and in the position of the pronotal process.

7. *Gargara sinuata* new species.

Small; black; shining; finely punctate, not pubescent. Head twice as wide as long, much reflexed below; eyes very large and prominent; ocelli very large and protruding. Prothorax convex, pronotum deeply indented above margin of head; humeral angles not prominent, blunt; strong sharp median carina extending from head to apex of posterior process; posterior process deeply sinuate and strongly produced upward, very suddenly acuminate, distal half not touching tegmina, extending as far as internal angle of tegmina, lateral carinæ distinct. Tegmina broad, base black and punctate, entire costal portion uniform ferruginous-opaque, apical fourth hyaline, veins prominent. Under parts of body and femora black; femora not swollen. Tibiæ simple, ferruginous, extremities lighter; tarsi flavous; claws flavous. Type, male. Length, 3 mm.; width, 1.4 mm.

Locality: Banguay Island.

A very remarkable little species, approaching the genus *Ebhul* Walk., in the structure of the posterior process, but differing in the character of the head and legs, and having the wing venation of a true *Gargara*. May be recognized at once by the sinuate and elevated posterior process and the very large prominent eyes and ocelli.

8. *Tricentrus decurvatus* new species.

Dark castaneous brown; finely punctate; densely pubescent with long golden hairs. Head as long as broad; clypeus almost square; eyes reddish; ocelli small, yellow, situated on a line passing through center of eyes. Pronotum high; horns triquerate, projecting almost directly outward just as far as the humeral angles, very slightly turned upward and backward, anterior edge rounded and posterior almost straight as seen from above; percurrent median carina strongest on posterior process; posterior process narrow, decurved, extending almost to tips of tegmina, sharply carinate above. Tegmina fuscous-hyaline, base opaque and punctured. Under parts of body and legs reddish; tibiae somewhat swollen; small white granule in joint between femur and tibia on each leg. Type, female. Length, 6 mm.; width, between extremities of horns, 3 mm.

Locality: Dutch New Guinea.

Near *T. gibbosulus* Walk., as I determine that species, but larger, of a different color, and at once recognized by the very long, decurved, pronotal process.

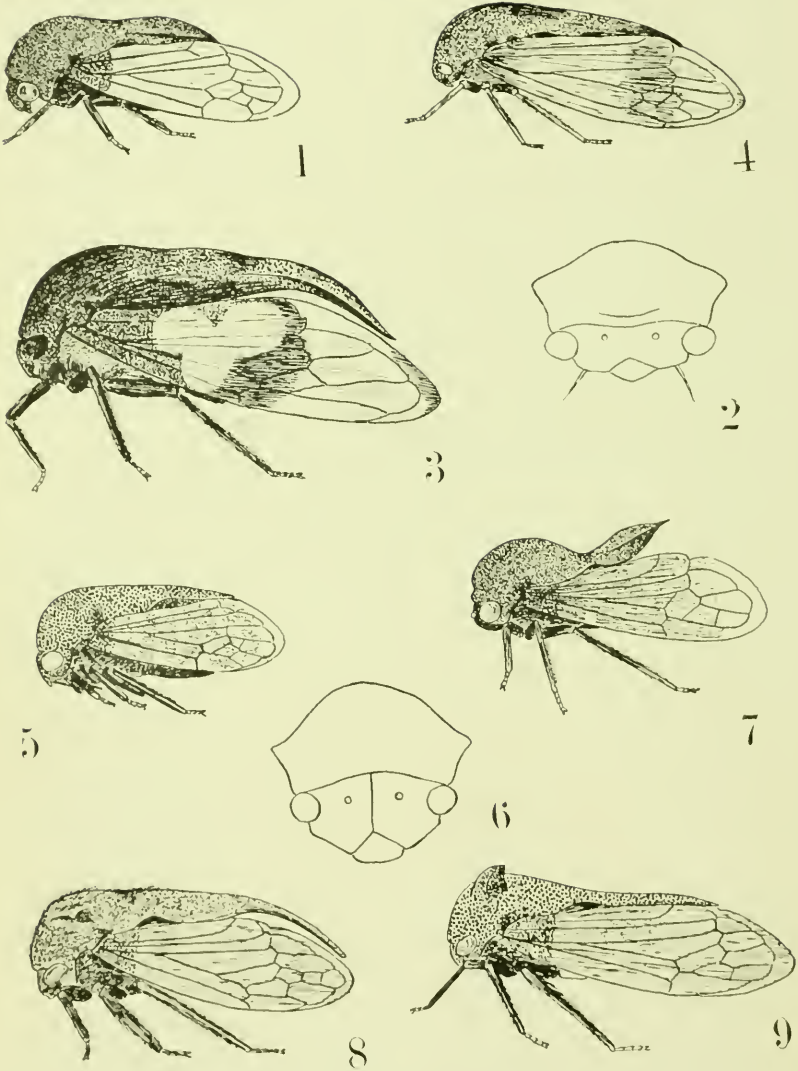
The genus *Tricentrus* is one of the most common genera in this part of the world. It is near *Gargara* but clearly set off from that genus by the presence of pronotal horns and the armed posterior trochanters.

9. *Tricentrus banguensis* new species.

Rich chocolate brown; punctate; finely pubescent. Head equally as long as broad, smooth, clypeus projecting for half its length below line of cheeks; eyes clear lemon yellow; ocelli yellow-white, situated above a line passing through center of eyes. Humeral horns extending strongly outward and upward, and slightly backward, as long as the distance between their bases, faintly bicarinate below. Posterior process slender, gradually acuminate, furnished with median carina which extends obsoletely through pronotum, tip of process reaching internal angle of tegmina. Tegmina smoky subhyaline, brown and punctate at base, veins brown, costal region slightly pilose. Under surface of body densely pubescent. Abdomen, legs and feet ferruginous. Type, female. Length, 5 mm.; width, between extremities of horns, 3 mm.

Locality: Banguay Island.

Near *T. cuneatus* Dist., but smaller, and distinct in the character of the posterior process.



East Indian Membracidae.

10. *Tricentrus brevis* new species.

Small; black; finely punctate, sparsely pubescent. Head as long as broad; eyes brown; ocelli white; clypeus projecting below line of cheeks and obtusely rounded at apex. Pronotum obtuse, median carina faint. Horns short, sharp, projecting outward and strongly backward and not as high as the dorsal line of the pronotum. Posterior process strongly carinate, extending slightly beyond internal margin of tegmina and lightly upraised at tip. Tegmina smoky hyaline, base black and punctate, narrow ferruginous fascia on outer margin of tip. Under surface of body black and pubescent. Legs and feet uniform ferruginous. Described from three males. Length, 4.6 mm.; width, between extremities of horns, 2.2 mm.

Locality: Banguey Island.

Close to the preceding species but smaller, more robust, and differing in the position of the pronotal horns and in the shape of the posterior process.

11. *Platybelus luteus* new species.

Uniform yellow; punctate; finely pubescent. Head slightly longer than broad, clypeus projecting for more than half its length beyond margin of cheeks; eyes brown; ocelli yellowish. Pronotum indented above head; metopidium convex. Horns long, strongly upraised, slightly carinate, apex sharp, projecting upward, outward and backward. Posterior process slender, slightly decurved, extending as far as the tip of the abdomen, apex fuscous. Median carina prominent, percurrent, strongest on posterior process. Tegmina clear hyaline, very lightly punctate at base. Under parts of body and legs yellow. Type, male. Length, 5.5 mm.; width, between extremities of horns, 3 mm.

Locality: Banguey Island.

Near *P. flavus* Sign., but differing, besides the habitat, in having the tegmina clear hyaline without fuscous markings.

This species bears a strong superficial resemblance to *Sextius virescens* Fairm., of which I have specimens from the East Indies, but the wings have three apical areas and the tibiæ are not dilated.

EXPLANATION OF PLATE VI.

- Fig. 1. *Gargara nigrocarinata* n. sp.
- Fig. 2. *Gargara brunnea* n. sp. Front view.
- Fig. 3. *Gargara trifoliata* n. sp.
- Fig. 4. *Gargara attenuata* n. sp.
- Fig. 5. *Gargara minuta* n. sp.
- Fig. 6. *Gargara sumbatæ* n. sp. Front view.
- Fig. 7. *Gargara sinuata* n. sp.
- Fig. 8. *Tricentrus decurvatus* n. sp.
- Fig. 9. *Tricentrus banguensis* n. sp.

RELATIVE ATTRACTIVENESS OF VEGETABLE,
ANIMAL AND PETROLEUM OILS FOR THE
MEDITERRANEAN FRUIT FLY (*CERATITIS CAPITATA* WIED.).

BY HENRY H. P. SEVERIN AND HARRY C. SEVERIN,

MARIETTA, OHIO.

Only a small amount of work has been done by entomologists to determine the relative attractiveness of vegetable, animal and petroleum oils for the Mediterranean fruit fly. Hopper (1907, p. 395) of Western Australia conducted an experiment in which four oils were used to trap the Mediterranean fruit fly. The oils were placed in tins and an examination of the traps 24 hours later gave the following results: "Turpentine:—6 tins used, 1 fly in one, and all the rest empty and dry. Benzine:—8 tins used, one fly in one and 4 in another, all tins dry. Naphtha:—4 tins used, no flies caught, all tins dry. Kerosene:—6 tins used, 149 flies caught (every tin containing some), all tins moist." Since in this experiment, all tins except those containing kerosene were found dry and empty, one would naturally expect that kerosene would attract the most fruit flies.

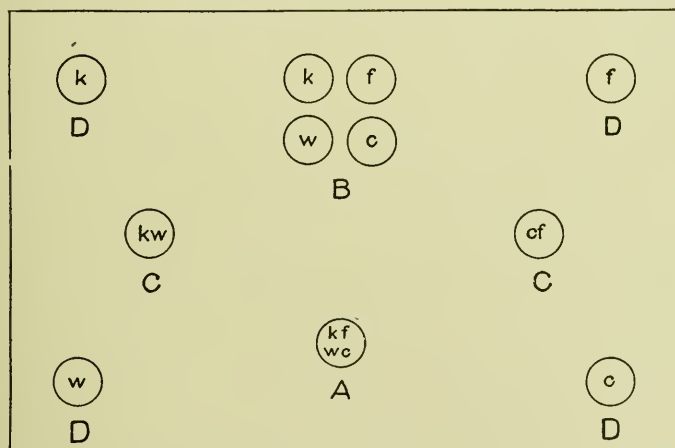
Williams (1907, p. 697) also of Western Australia "carried on an experiment with benzine, naphtha, turpentine, ammoniated tar water, methylated spirits, etc., but in no instance did any of them equal kerosene."

Lounsbury (1908, p. 7) of South Africa tried to ascertain the relative attractiveness of kerosene, turpentine and water for the Mediterranean fruit fly. His experiments were carried on with several hundred fruit flies which were allowed to emerge from infested fruit placed in a cage ($2 \times 1\frac{1}{2} \times 1$ feet) and inside of which were the oils and water. Within one hour, eleven fruit flies visited the turpentine and in three and one half hours seven went to the kerosene and seventeen went to the water. Lounsbury writes, "Not unnaturally I got the impression that the fruit flies, 'mistook the oil for water and were trapped in attempting to drink or to alight to drink.'" In experiments III and IV our results with kerosene, turpentine and water are given under field conditions.

Gurney (1910, pp. 5-6) of New South Wales also experimented with a number of oils to trap the Mediterranean fruit fly. He writes: "The following oils, placed in saucers in the orchards, were tried as traps for the adult flies:—Kerosene, citronella, linseed, salad, whale, neatsfoot and fish. The non-success of any of these oils during these seasons may have merely indicated the scarcity of the Mediterranean fruit fly."

In view of the absence of exact data concerning the relative attractiveness of many of the vegetable, animal and petroleum oils for the Mediterranean fruit fly, and since none of the entomologists mentioned gave any record as to whether or not a superabundance of males were captured in the oils, it was decided to carry on a series of tests along this line. In each of the following experiments, kerosene (Star oil about 120° Bé.) was used as a check. The number of fruit flies captured in kerosene compared with the number caught in other oils would give the relative attractiveness of the oils for the Mediterranean fruit fly.

A glance at the following diagram will show the arrangement of



the oil traps in the orchard. A circle represents a single fruit tree and the letter within the circle designates the name of the oil in the trap. In selecting the letters, the first letter of the name of the oil was used, viz:—k=kerosene, c=citronella, w=whale and f=fish oil.

For a description and picture of the oil traps, such as were used

in all of the following experiments, we refer the reader to a previous paper (1912, p. 403).

In the first experiment four traps containing either kerosene, fish, whale or citronella oil were wired at the same height in a single large Waialua orange tree (*Citrus aurantium sinense*) represented in the diagram by a circle with the letters k, f, w. and c (Diagram, A). In this same experiment four lemon trees (*Citrus medica limonum*) closely clustered together were each provided with a trap containing one of the above oils (Diagram, B). In each of two navel orange trees (*Citrus aurantium*) situated at some distance from each other, two traps were fastened containing either kerosene or whale oil and citronella or fish oil (Diagram, CC). Lastly, four traps each of which contained one of the four oils, were put in four navel orange trees situated in different sections of the orchard (Diagram, DDDD). The following figures indicate the results of a three days' catch in each oil trap:

EXPERIMENT I.

Trees.	One Waialua Orange.	Four Lemon.	Two Navel Orange.	Four Navel Orange.	Total Males.
Kerosene	123	42	26	70	261
Citronella oil	0	3	0	1	4
Whale oil	0	0	0	0	0
Fish oil	0	0	0	0	0

As there still was a possibility that the volatile parts of the different oils had interfered with one another in the above experiment, it was decided to test out each oil separately in another orchard. A trap containing citronella oil was wired in each of three guava trees (*Psidium guajava pomiferum*), one tropical almond (*Terminalia cattapa*), one bread fruit (*Artocarpus incisa*) and one lime tree (*Citrus medica limetta*). This experiment was continued for a week, at the end of which time the traps were replaced with a clean set containing whale oil. The whale oil was tested out in the same trees for nine days, then the fish oil was substituted for fourteen days and finally kerosene for one day. The results in this experiment were as follows:

EXPERIMENT II.

	Traps.	Days.	Males.
Citronella oil	6	7	49
Whale oil	6	9	0
Fish oil	6	14	2, 2 females.
Kerosene	6	1	138

In the next experiment the relative attractiveness of kerosene, turpentine, cocoanut oil and water for the Mediterranean fruit fly was tested. This experiment was conducted in the first mentioned orchard and the oil traps were arranged as shown in the previous diagram. Since turpentine is very volatile, a man was sent to the orchard several times a day to pour a new supply of this oil into the traps. This experiment was carried on for eight hours during two days with the following results:

EXPERIMENT III.

	Traps.	Hours.	Males.
Kerosene	4	16	172
Turpentine	4	16	8
Cocoanut oil	4	16	0
Water	4	16	0

The same oils were now tested out separately for a period of eight hours on three different days; the water, however, was kept in ten traps wired in citrus trees for a period of thirteen days. The results were as follows:

EXPERIMENT IV.

	Traps.	Hours.	Males.
Kerosene	4	8	41
Turpentine	4	8	2
Cocoanut oil	4	8	0
Water	10	13 days	0

Twelve traps containing vinegar were wired to citrus trees for two days but no fruit flies were captured in these traps. Vanilla extract was also used but gave only negative results.

Experiments in trapping the Mediterranean fruit fly with oils belonging to the naphtha distillate derived from crude petroleum were conducted in two orchards. On account of the volatileness of these oils, the experiments were continued for only eight or nine hours a day, but the traps were never allowed to dry out. The number of traps used, the number of hours each experiment was conducted and the results obtained are as follows:

Naphtha Distillate.

EXPERIMENT V.

	Traps.	Hours.	Males.
Kerosene about 120° Bé.....	5	24	81
Gasoline about 86° Bé.....	5	24	16

EXPERIMENT VI.

	Traps.	Hours.	Males.
Kerosene about 120° Bé.....	5	16	21
Gasoline about 63° Bé.....	5	16	13

EXPERIMENT VII.

	Traps.	Hours.	Males.
Kerosene about 120° Bé.....	8	18	73
Benzine about 58° Bé.....	8	18	53

EXPERIMENT VIII.

	Traps.	Hours.	Males.
Kerosene about 120° Bé.....	6	16	53
Distillate about 48° Bé.....	6	16	55

EXPERIMENT IX.

	Traps.	Hours.	Males.
Kerosene about 120° Bé.....	4	24	97
Gasoline about 86° Bé.....	4	24	34
Benzine about 58° Bé.....	4	24	91

EXPERIMENT X.

	Traps.	Hours.	Males.
Gasoline about 86° Bé.....	7	8	15
Benzine about 58° Bé.....	7	8	53

It is evident from these experiments that gasoline (about 86° Bé.) attracts a smaller number of fruit flies than kerosene or benzine (Experiments V, IX, X). Distillate (about 48° Bé.) was the only oil which attracted more fruit flies than kerosene (Experiment VIII). The experiment with the distillate and kerosene was carried on for a period of eight hours during two days and the catch for each day may be worth recording. The first day the results were: kerosene 31, distillate 38, a difference of 7 in favor of the distillate; but the second day the ratio was: kerosene 22, distillate 17, a difference of 5 in favor of the kerosene. The experiment with the distillate must be repeated, however, in order that definite conclusions may be drawn concerning these oils.

In the next experiment the oils classed under the burning oil distillate were tested in traps which were wired to fruit-bearing mango trees. The traps were shifted about in the trees from time to time but this did not have any marked effect on the number of specimens

captured in the different oils. This experiment was carried on for a period of sixteen days and the following figures indicate the results obtained:

Burning Oil Distillate.

EXPERIMENT XI.

	Traps.	Days.	Males.
Export oil about 110° Bé.....	1	16	190
Kerosene about 120° Bé.....	1	16	552
Mineral seal oil	1	16	80
Colza burning oil	1	16	10
Perfection signal oil	1	16	1

It is evident from the results of this experiment that the heavy burning oils, such as mineral seal, colza burning and perfection signal, do not attract as many fruit flies as kerosene and export oil. In these three heavier burning oils the volatile part which attracts the Mediterranean fruit fly must be present in still less quantities than in gasoline (about 86° Bé.).

In the following experiment two of the lubricating oils were tested and the results were as follows:

Lubricating Oil Distillate.

EXPERIMENT XII.

	Traps.	Days.	Males.
Kerosene about 120° Bé.....	4	3	86
Renown engine oil F. 375	4	3	6
Atlantic red engine oil F. 350	4	3	0

Since all of the oils classified under the naptha distillate, burning oil distillate and lubricating oil distillate are obtained from crude petroleum, it was reasonable to suppose that the crude oil itself would attract the fruit fly. The results with this oil were as follows:

EXPERIMENT XIII.

	Traps.	Days.	Males.
Kerosene about 120° Bé.....	4	3	60
Crude petroleum.....	4	3	41

In the following table the relative attractiveness for the Mediterranean fruit fly of animal and vegetable oils and oils derived from crude petroleum is given, the attractiveness of kerosene for the fruit fly being taken as 100 per cent.

TABLE I.

	Experiment.	Per Cent.
Vegetable oils	{ Citronella oil I	1
	{ Turpentine III and IV (average)	.04
	{ Cocoanut oil III and IV (average)	0
Animal oils	{ Whale oil I	0
	{ Fish oil I	0
Naphtha distillate	{ Distillate about 48° Bé..... VIII	103
	{ Benzine about 58° Bé..... VII and IX (average)	82
	{ Gasoline about 63° Bé..... VI	61
	{ Gasoline about 86° Bé..... V and IX (average)	27
Burning oil distillate	{ Export oil about 110° Bé..... XI	34
	{ Star oil (kerosene) about 120° Bé. XI	100
	{ Mineral seal oil XI	14
	{ Colza burning oil XI	1
	{ Perfection signal oil XI	.1
Lubricating oil distillate	{ Renown engine oil F. 375 XII	6
	{ Atlantic red engine oil F. 350.. XII	0
	{ Crude petroleum XIII	68

It is evident that the attraction of the Mediterranean fruit fly to these oils was confined almost entirely to the male sex. Female flies were present in these orchards because hundreds were caught by sweeping with an insect net among the fruit trees. Trapping the pest with kerosene was carried on for a period of eight months in the Hawaiian Islands in connection with other experiments and the results show that of every 1000 fruit flies captured only 3 on an average were females, the remainder being males.

Why should enormous numbers of male fruit flies and only a few females be captured in certain oils? Concerning the behavior of *Dacus zonatus* towards citronella oil, Howlett (1912, p. 413) writes: "Since the reaction was confined to the male sex and did not appear to be in any way connected with feeding habits, it seemed most reasonable to suppose that the smell might resemble some sexual odor of the female which in natural conditions served to guide the male to her." This is, in substance, a view which we also expressed to a number of entomologists and mentioned in a paper read before the Agricultural Seminar in Honolulu on January 11, 1912, to explain the behavior of the male Mediterranean fruit fly towards kerosene. Howlett believes that "the smell is in all probability perceived by means of the

antennæ," for, after he had carefully amputated these "at the base of the second joint," none of the mutilated insects were attracted to the oil of citronella.

If it is true that certain oils give off an odor which resembles that emitted by the female fruit flies to attract the opposite sex, then how would the fact be explained that a few females are usually caught in the oils? We should have to assume that the specialized sense organs present in the males to locate the females are absent in the latter. We would then be forced to conclude that the females were not attracted to the petroleum oils, but came within the sphere of influence of the oil by accident, became stupefied and dropped into the oil. There is, of course, the possibility that the reaction of the male Mediterranean fruit fly towards some volatile part of the petroleum oils may be a positive chemotaxis "not representing the sexual smell of the female," a possibility to which Howlett also calls attention in the behavior of *Dacus zonatus* towards citronella oil.

The behavior of the Mediterranean fruit flies was occasionally observed in the neighborhood of the traps. In some instances, fruit flies remained at rest on the inside of the pans for long periods of time as if stupefied by the volatile parts of the oil. In other cases, the flies would walk along the inside of the pan for a time, then take wing and fly up to a neighboring leaf or twig, or in their apparently dizzy, zigzag flight over the surface of the petroleum oils they would plunge into the oil and generally cease all activity noticeable to the naked eye in less than half a minute.

It certainly is peculiar that the male Mediterranean fruit flies plunge into the petroleum oils to their own destruction. The flies may be attracted to the oil as a result of a chemotaxis due to one or more hydrocarbons or to the impurities of the petroleum oils, such as the sulphur constituents or nitrogenous products. Small quantities of sulphides are detected by the human nose and it may be possible that the minutest traces are perceived by the fruit flies. Furthermore, sulphides have recently been found within the bodies of insects. Again, the hydro-carbons of the oil may act as an anesthetic, and stupefy the insects whenever they remain within their influence. It is known that the volatile parts of gasoline, for instance, have a stupefying effect upon animals. According to a scientist connected with the Standard Oil Company, cases are on record where men, who

had opened barrels of gasoline, were suddenly overcome by the fumes and plunged "head first" into the oil. Large gasoline tanks which have been recently emptied are dangerous for men to go into, and require about twenty-four hours of ventilation before they are safe for a human being to enter.

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ON THE MISUSE OF THE TERMS PARAPTERON, HYPOPTERON, TEGULA, SQUAMULA, PATEGIUM AND SCAPULA.¹

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One of the terms most frequently misapplied by writers on insect morphology, is the designation parapteron. Each of the lined areas in fig. 2 (*i. e.*, *pa*, *pas*, *prs*, *aba*, *pba*, and *acs*) as well as the sclerites *sur*, *npt*, and *sa* have been designated as the "parapteron." Since it is quite evident that all of these cannot be so termed, without creating confusion, it may be of some interest to attempt to establish the correct application of the designation parapteron, as intended by its author.

¹ Contribution from the Entomological Laboratory of the Massachusetts Agricultural College, Amherst, Mass.

In its Gallicized form "paraptere," the term was first used by Audouin, '24. In his figures of the thoracic sclerites of *Dytiscus* (the only insect used to illustrate his paper) Audouin clearly and unmis-takably designates as the "paraptere," the sclerite labelled *hyp* in fig. 3 (of the present paper). Audouin, '24 (page 420) likewise describes the "paraptere" as a sclerite which "unites dorsally with the episternum and epimeron to form a support for the wings and tergum"—a description which applies to the sclerite *hyp* (fig. 3) alone, as can be seen by glancing at his figure of *Dytiscus*' mesothorax.

On page 122, Audouin, '24, states that in his previous publicaitons he had designated the sclerite in question (which "is always supported by the episternum, and sometimes prolonged ventrally along the anterior margin of the latter") as the "*hypopterc*." Having extended his studies, however, and having found that in other insects, there exist certain plates which he considers as representing these plates although they are not situated below the wing (and may sometimes even "pass in front of the wing and take up a position above the base of the latter"—*i. e.*, may occupy the position of the sclerite *tg*, figs. 2 and 6), Audouin states that he now prefers to change the term hypo-pterion (*i. e.*, "under-the-wing") to para-pterion (*i. e.*, "near-the-wing"), in order to signify its changing position in relation to the wing base. In other words, he erroneously considers that certain sclerites above the base of the wing (*i. e.*, the tegulæ, *tg*, figs. 2 and 6) are homologous with the hypopteron (*hyp*, of figs. 2 and 3), and includes them all under the general designation parapteron.

Audouin's own words on the subject are as follows (Audouin, '24, page 122) as translated by Snodgrass, '10^a (foot-note to pages 20 and 21) . . . "finally there exists a piece but little developed and seldom observed, connected with both the episternum and the wing. It is always supported by the episternum and is sometimes prolonged ventrally along its anterior margin, or again, becoming free, passes in front of the wing and may even come to lie above the base of the latter. At first we designated this sclerite by the name of hypopteron, but on account of its change of position relative to the wing base, we now prefer the name of parapteron." And again (Audouin, '24, page 420) . . . "the episternum, the parapteron and the epimeron all fuse dorsally and constitute a support for the wings and tergum."

It is clearly evident that this reference to a sclerite which is

"always supported by the episternum, and is sometimes prolonged ventrally along the anterior margin of the latter" is applicable to the sclerite *hyp* (fig. 3) alone. Furthermore, it alone, of the sclerites described by Audouin, conforms to the statement that . . . "the parapteron, the episternum, and the epimeron all unite dorsally to constitute a support for the wings and tergum." Lastly, the only sclerite designated as the parapteron in the figures accompanying Audouin's work, is the region *hyp* in the mesothorax of *Dytiscus* (fig. 3 of the present paper) where Audouin clearly and unmistakably labels this sclerite the "paraptere." In the face of such conclusive evidence, it hardly seems possible that any one who is capable of analyzing Audouin's definition of the parapteron, or who will take the trouble to glance at his labelled figure of the mesothorax of *Dytiscus* (the only insect used to illustrate his paper) will be prepared to deny that the sclerite *hyp* (figs. 2 and 3) is the one referred to in the first part of Audouin's definition of the parapteron.

Having thus established beyond all peradventure, the identity of the sclerite to which Audouin intended that the first part of his definition of the "paraptere" should apply, the next question to be determined, is what sclerite did Audouin have in mind in the second part of his definition of the "paraptere," in which he speaks of it as "becoming free and passing in front of the wing to take up a position above the base of the latter." The only sclerite which conforms to this part of the definition of the "paraptere," is the tegula, *tg* (figs. 2 and 6). It occupies a position slightly in front of and above the base of the wing, thus fitting the latter part of Audouin's definition perfectly.

If there were any grounds for doubting that Audouin here refers to the tegula, *tg*, they would be immediately dispelled by Audouin's clear and definite statement concerning the matter, in a footnote to his translation of MacLeay's article on the thoracic sclerites of the wasp *Polistes*. The footnote (Audouin, '32, footnote to page 41 of author's separate, or to page 135 of the "Annales" may be translated as follows . . . "in fact, I consider as the parapteron, the little plate so easily seen covering the base of the fore wings in the Hymenoptera and Lepidoptera, designated as the scale, epaulet, or squamula. Mr. MacLeay labels it *a*, in his figures 1, 2 and 4." This statement is certainly lucid and definite enough to satisfy the most skeptical, and one

needs but to refer to the figures in question, to verify the statement that the tegula is here intended (the tegula was formerly referred to as the scale, epaulet, or squamula).

Professor C. H. Fernald has very kindly called my attention to another work (Audouin, '40) in which Audouin both figures and defines the tegula, *tg* (of the Pyralidæ) as the "epaulette ou paraptere." Thus all of the evidence to be adduced from Audouin's definitions and figures, merely serves to confirm the opinion of those who maintain that Audouin's definitions of the "paraptere" refer to both of the sclerites *tg* and *hyp* (figs. 2, 3, and 6) which Audouin incorrectly considered as homologous, and included under the same name.

Since Audouin at first (Audouin, '20) referred to the sclerite *hyp* alone as the hypopteron, and only later (Audouin, '24) incorrectly includes it, together with the tegula, *tg*, under the designation parapteron, through a misunderstanding concerning the true homologies of the sclerites in question, the most logical course of procedure would be to retain the designation hypopteron for the sclerite *hyp* (figs. 2 and 3) as originally used by Audouin, and to restrict the designation parapteron, to the tegula, *tg* (figs. 2 and 6) as was later done by Audouin, '40, making it a synonym of epaulet, or tegula.

This method of procedure has much to recommend it. In the first place, as we have seen, Audouin (the author of the term) himself makes the designation parapteron synonymous with the terms then applied to the tegula (*i. e.*, scale, squamula, or epaulet). In the second place, Audouin's contemporaries (*e. g.*, Lyonnet, '32, Westwood, '38 and many others) adopted this usage, and applied the designation parapteron to the tegula, thus showing that this usage was in vogue even in Audouin's day, and had his sanction. In the third place, this usage (*i. e.*, of applying the term parapteron to the tegulæ) is extremely widespread, and is generally accepted by writers of various nationalities. And lastly, this usage is sanctioned by many modern works of reference—*e. g.*, Packard, '98, Sharp, '99, Henne-guy, '04, Smith, '06, Folsom, '06, Houlbert, '10, Jardine, '13, Comstock, '13, and many others.

From the foregoing discussion, it is clearly evident that the term parapteron should be applied to the tegula alone (as a synonym). The grounds for so doing have been given in detail, because some recent writers do not think that there is sufficient justification for

restricting the term parapteron to the tegula, and insist upon designating other sclerites by this term—a course of procedure which unnecessarily complicates matters, and merely serves to heighten an already sufficiently disconcerting confusion in the application of morphological terminology.

Snodgrass, '08, terms the plate *aba* (fig. 2) the "first or anterior parapterum," and designates the plate *pba* (fig. 2) as the "second, or posterior parapterum." Later, Snodgrass ('09_b) likewise includes the plates *sa* (Fig. 2) under the general designation paraptera, terming them the "epimeral paraptera." In a lengthy footnote to pages 20 and 21 of his "Anatomy of the Honey-Bee," Snodgrass, '10_a, seeks to justify this usage of the term parapteron, on the ground that (in his opinion) Audouin, '24, referred to the plates *aba* and *pba* in his definitions of the parapteron, and that this term should be extended to include the subalar plates *sa* (fig. 2) as well.

The only reason given by Snodgrass for thus arbitrarily applying the terms paraptera to the wrong plates, is the incorrect statement that Audouin had these plates in mind when he described the paraptera in the passages quoted above. That this supposition is absolutely wrong, has already been demonstrated, and Snodgrass's charge that . . . "modern writers such as Packard and Folsom who make the term paraptera synonymous with tegulae are certainly wrong" (Snodgrass, '10_a footnote to page 21) was evidently made without consulting all of the available evidence, else so keen an observer as he would never have committed such an obvious error.

The incorrect application of the term parapteron to the little plates under the wing, and at its base, is apparently traceable to Lowne, '90, who designates the plate *aba* (figs. 2 and 5) as the parapteron. Hewitt, '70, who accepts Lowne's interpretations in most instances, designates this plate as the "parapterm," apparently meaning to call it the parapteron. According to Snodgrass, Comstock regards one of the basalar sclerites (*aba* or *pba*) as the parapteron, but I have been unable to verify this statement. Berlese, '06-'09, applies the term "parattero" (*i. e.*, parapteron) to the sclerite *sa* (fig. 2), but all of these usages are incorrect.

Other incorrect applications of the designation parapteron, are as follows. Hammond, '81, applies the term parapteron to the sclerite *acs* (figs. 2 and 5), suggesting that it may be the "paraptere" de-

scribed by Audouin; but he is not certain of this point. That Hammond's surmise is incorrect, has already been demonstrated.

Landacre, '02, incorrectly applies the term *paraptera* to the little ossicles *npt* (fig. 2) at the base of the elytra of the beetle *Passalus*, and Newport, '39, misapplies the term *parapteron* to the sclerite *sur* (fig. 2) in his figure of the thorax of the beetle "*Hydrous*," although in his figures of the thorax of *Sphinx* and *Ichneumon*, he quite correctly refers to the tegulæ as the *paraptera*.

Emery, '00, designates the region *prs* (figs. 2 and 6) as the "parattero del mesonoto," in the thorax of various ants. It is perhaps superfluous to add that this usage is also incorrect.

Escherich, '06, who reproduces Emery's figures of the thorax of ants, terms the plate *prs* (figs. 2 and 6) the "proscutellum." The designation *proscutellum*, however, should always denote the scutellum of the prothorax (if such exists) so that it is necessary to change the term *proscutellum* to *prescutellum*, in referring to the sclerite *prs*. The latter term is evidently the one Escherich intended to use.

The unfounded statement that MacLeay, '30, applied Audouin's term *parapteron* to the tegulæ, is frequently made (*e. g.*, Jardine, '13, page 156; Snodgrass, '09b, page 581; Packard, '98, page 89; and others). It is difficult to understand how such careless statements can be made, for MacLeay, '30, did not call the tegulæ "*paraptera*," at all. He calls them "*squamulæ*," and attributes this usage to Latreille. Latreille, however, called them "*pterygodes*." Any one who will take the trouble to read MacLeay's descriptions, and look at his figures, will readily see that the sclerites which he designates as the "*paraptera*" are not the tegulæ at all. Thus in *Polistes*, MacLeay states that the mesothoracic plates (which he terms the *parapides*) designated as *pa* in fig. 2 (of the present paper) are possibly the prothoracic *paraptera* pushed back out of place! He gives no reasons for this view. The plates which MacLeay designates as the mesothoracic *paraptera* are the sclerites *pas* (fig. 2), one on either side of the scutellum. The sclerites which he designates as the meta-thoracic *paraptera* are the lateral portions of the entire metanotum, in which the subregions have united to a greater or less extent, and have then become divided into a median and two lateral regions (one on either side) by the formation of secondary sutures, or those not originally present. Thus, the only sclerites regarded as the "*parap-*

tera," by MacLeay are those designated as *pa* and *pas* in fig. 2, as well as the entire lateral region of the metanotum, so that the statement that MacLeay, '30, referred to the tegulæ as the paraptera is wholly unfounded—although it would have been entirely correct for MacLeay to have termed the tegulæ paraptera, had he chosen to do so. It is perhaps superfluous to add, that the sclerites which MacLeay actually did designate by the term paraptera, were incorrectly designated.

With regard to the application of the term hypopteron, certain writers (Smith, '06) would make it, together with the term parapteron, synonymous with tegula (*tg* of fig. 6). The term hypopteron, however, means "*under-the-wing*," and is wholly inapplicable to the tegula, which is situated *above* the wing. As originally used by its author (Audouin, '20), the designation hypopteron was applied to the sclerite *hyp* (fig. 3), for which it is a very appropriate designation. It was only later, and due to a mistaken interpretation of the sclerites, that Audouin, '24, included the region *hyp* together with the tegulæ, under the designation parapteron, so that it would be perfectly logical and appropriate to restrict the term hypopteron, to the sclerite *hyp*, and to make the term parapteron synonymous with tegula.

Snodgrass, '09_b, figures the hypopteron (*hyp* fig. 3) in his illustrations of the thoracic sclerites of the Coleoptera (Snodgrass, '09_b, figs. 106, 107, etc.) but does not designate it by any name, in the Coleoptera. In his fig. 70, of the mesopleuron of the grasshopper *Dissosteira*, however, he designates a sclerite homologous with the hypopteron, as the preepisternum. This is the only case in which Snodgrass uses the term preepisternum correctly. For example, in his figure 29, of the prothorax of the roach *Byrsotria*, the plate designated as the "preepisternum," corresponds to the fusion product of sclerites *lpl* and *lst* (fig. 2, of the present paper). On the other hand, in his figure 94, of the mesopleuron of the earwig *Spongiphora*, he applies the term preepisternum to the plate *lpl* (fig. 2, of this paper) alone, and in his figure 35, of the mesothorax of the roach *Ischnoptera*, he designates as the preepisternum, the plate *aba* (fig. 2) alone. The term preepisternum was first used by Hopkins, '09, who correctly applied it to the hypopteron (*hyp*, fig. 3) of the beetle *Dendroctonus*. As used by its author, the designation preepisternum would therefore be synonymous with hypopteron, which should be applied to the sclerite *hyp* (figs. 2 and 3) alone.

In his paper on the "Thorax of the Hymenoptera," Snodgrass, '10_b, introduces a new synonym for the hypopteron *hyp* (fig. 2), designating it as the "prepectus," and giving as his reason for so doing, that in the Hymenoptera, he thinks that this sclerite is a new formation, not homologous with the "preëpisternum" described in his previous papers. In his own words (Snodgrass, '10_b, page 78) . . . "though the prepectus has something the appearance of the preëpisternum of the more generalized orders of insects, especially if we assume a continuity between the prepectus and the presternum, yet the phylogentic gap between them is too great to permit the homologizing of one with the other. The prepectus of the Hymenoptera appears to be a purely secondary production within this order."

Now, as we have seen, Snodgrass confused the homologies of the sclerites which he designated as the "preëpisternum," applying this term to totally different sclerites in different insects. Under these conditions, it is very natural that some of these incorrectly designated sclerites which he terms the "preëpisternum" (such for example, as the plate *lpl*, of fig. 2, of the present paper—which he terms the "preëpisternum" in his figure 94, of the earwig) are not homologous with the sclerites which he terms the prepectus, in his Hymenopteron paper (*i. e.*, the sclerite *hyp*, fig. 2). The sclerite which Snodgrass, '09_b, terms preëpisternum, in his figure 70 of the grasshopper *Dissosteira*, however, is most assuredly the homologue of the "prepectus" of his Hymenopteron paper. Furthermore, the author of the term preëpisternum (Hopkins, '09) applied it to a sclerite of *Dendroctonus*, homologous with the sclerites designated as the prepectus in Snodgrass's Hymenopteron paper. The terms preëpisternum and prepectus are therefore synonymous, and both are synonyms of the designation hypopteron, applied to the sclerite *hyp* (fig. 3) by Audouin, '20.

Jordan, '02, terms the sclerite *hyp*, the "peristernum," in his figures of the grasshopper *Acridium* and the beetle *Meloe*. Enslein, '12, terms it the "praesternum" in his figure of the sawfly *Tomostethus*, apparently not realizing that the term presternum is used to designate a sclerite of the sternal region.

From the foregoing discussion, it is apparent that the only logical course of procedure is to retain the designation hypopteron, for the sclerite *hyp* (fig. 3) as originally used by its author Audouin, '20.

Since the term hypopteron is sometimes incorrectly applied to the tegulae, it might possibly be preferable to designate the sclerite *hyp* (fig. 3) as the preepisternum, as is done by Hopkins, '09; or to designate it by Snodgrass's term prepectus, which is an extremely expressive and appropriate one—this, however, is purely a matter of personal preference.

The term tegulae should be applied only to those sclerites homologous with the little shell-like scales (figs. 2, 4, and 6, *tg*) situated slightly above and in front of the base of the mesothoracic wings, easiest seen in the Hymenoptera and Lepidoptera.

In his work on the thoracic sclerites of the blowfly, Lowne, '90, applies the term epaulet to "a large scale fringed with black bristles" and states that it "does not correspond with the tegula of the Hymenoptera" (Lowne, '90, page 200). In some of Lowne's figures it is very difficult to determine exactly to what sclerite he intends that his designation epaulet should refer; but in his figure 5, of plate X, the "epaulet" is clearly the teglua (*tg* fig. 4, of the present paper) and despite Lowne's statement to the contrary, it is homologous with the tegula of the Hymenoptera (fig. 6, *tg*).

Since Loew, '62, and other Dipterologists after him, have very inconsiderately applied the term tegulae to the so-called calyptra of Rondani, '56 (or the two lobe-like expansions of the hinder margin of the wing membrane, near its base—fig. 4, *dc* and *pc*), it might perhaps be preferable to employ the term epaulet to designate the true tegulae, *tg* (fig. 4) in the Diptera, and thus avoid ambiguity. This usage is sanctioned by Audouin, '40, himself, who, together with Chabrier, '20, and many of the earlier French writers, use the designation "epaulette" as a synonym of the terms applied to the tegulae of various insects.

The term squamulae was applied to the tegulae, *tg* (figs. 2 and 6) by MacLeay, '30, (who attributed this usage to Latreille) and this usage has been adopted by a few subsequent writers. This misapplication of the term, however, is very unfortunate, since the designation squamula has been used by many Dipterologists, to denote one or both of the calyptra (fig. 4, *dc* and *pc*) mentioned above.

Linné, 1758, who introduced the term squamula, applied it to the calyptra, although it is impossible to tell from his description, whether he intended to apply the term to one, or to both of the calyptra.

Curtis, and a number of other Dipterologists apply the designation *squamulae* to both calyptra. Lowne, '90, however, restricts the term *squamula* to the distal calypter (*dc*, fig. 4), termed the *antisquama* by Osten-Sacken, '96, and designates the proximal calypter (*pc*) as the *squama*.

A number of Dipterologists use the designation *squama* for one or both of the calyptra (*c. g.*, Erichson, Fabricius, Fallen, Illiger, Meigen, Scheiner, Say, Zetterstedt—and many others) so that the terms *squama* and *squamula* should be applied to the calyptra, and not to the tegulae, if these terms are to be used at all. In addition to applying the designation *squama* to the tegulae, some writers have also applied it to a sclerite of the head region, to a genital sclerite, and to the apparent first abdominal segment (the knot or scale at the base of the abdomen) in ants.

The term *patagium* is incorrectly applied by Lowne, '90 (page 198) to the posterior, or anal region of the wing. Fortunately, this incorrect usage was not accepted by Dipterologists, or the confusion in the use of this term would have been unnecessarily increased.

Kirby and Spence, '26, correctly restricted the term *patagia* to the erectile lobe-like appendages borne on the pronotum of certain Lepidoptera (fig. 1, *pat*), and attributed this usage to Mouffet, 1634. These prothoracic structures occur on the pronotum alone, and are not homologous with the tegulae (figs. 4 and 6, *tg*) which are mesothoracic structures having nothing in common with the *patagia*. Riley, '04, called attention to this fact,² a number of years ago as did Chodkowski and many others before him, but Lepidopterologists have disregarded this fact, and still continue to apply the term "*patagia*" to the tegulae. If the tegulae are called "*patagia*," what are we to term the true *patagia*, when both the *patagia* and tegulae are present in the same insect, as in *Agrotis*, for example? Some such designation as "*propatagia*" might be used to distinguish the prothoracic structures from the tegulae; but this would be quite unnecessary, if the original and correct application of the terms *patagia* and tegulae were adhered to.

² In an article entitled "*Das Pronotum und die Patagia der Lepidopteren*," published in the *Deutsch. Ent. Zeit.*, Schultz, 1914, has recently called attention to this point, and has shown that the true *patagia* are in no wise homologous with the tegulae.

Kirby and Spence, '26, very clearly state that the patagia are prothoracic structures, and that the tegulæ are mesothoracic. They likewise apply the designation patagia to the true patagia, and the designation tegulæ to the true tegulæ, so that the commonly accepted statement made by Newport, '39 (page 923) that Kirby and Spence term the tegulæ "patagia," is wholly false and unjust. The unfortunate confusion caused by the interchanging of the terms patagia and tegulæ, is not attributable to Kirby and Spence; but is due to the ignorance, or carelessness of later writers.

The designation scapula (or scapulæ) and scapularia have been very frequently misapplied by workers in different orders or in different families of the same order of insects. Thus the term scapula has been applied to the patagia, tegulæ, etc., of Lepidoptera, to the antero-lateral sclerites in the mesonotum of Proctotrypidæ, to the postero-lateral sclerites in the mesonotum of Coleoptera, to the lower lateral region of the mesonotum of Hemiptera, to the trochanter of the anterior leg in various insects, and to the whole, or a portion of the mesopleuron of certain Hymenoptera and Coleoptera. The last mentioned usage conforms to that of Knoch, 1801 (Neue Beitræge) who introduced the term, so that it is preferable to restrict it to the pleural sclerites.

SUMMARY.

The points brought out above may be briefly summarized as follows.

The term **paraptera** should be applied only to those sclerites homologous with the shell-like scales situated slightly in front of, and above the bases of the mesothoracic wings (best seen in Hymenoptera, Lepidoptera, etc.) . . . *tg* of figs. 2 and 6. These are not homologous with the patagia—which are prothoracic structures (*pat* of fig. 1) having nothing in common with the paraptera. Synonyms of paraptera are tegulæ, pterygodes, and epaulets. (The terms squamule, patagia, scapulæ, humeri, etc., sometimes applied to the structures in question, are misapplied.)

The term **hypopteron** should be restricted to the narrow region extending along the anterior margin of the pleuron in certain Coleoptera, Orthoptera, Hymenoptera, etc. (*hyp* of fig. 3). Synonyms of hypopteron are peristernum, præpisternum, and prepectus.

The term **tegulæ** should be restricted to the structures referred to above, as the paraptera, or epaulets.

The term **squamulæ** should be restricted to the lobe-like expansions of the posterior margins of the mesothoracic wings, near their bases (*pa* and *da* of fig. 4). As thus used, the designation *squamulæ* is synonymous with *calyptra* (sometimes called "calypta," and *calyp-teres*) and *squamæ*.

The term **patagia** should be applied only to the lobe-like tergal structures of the pronotum of certain Lepidoptera, etc. (*pat* of fig. 1). These are not homologous with the *tegulæ* (*tg* of fig. 6). The designation *propatagium* may be used as a synonym, if there is any danger of ambiguity.

The term **scapulæ** should be applied only to the pleural sclerites.

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Fig. 1

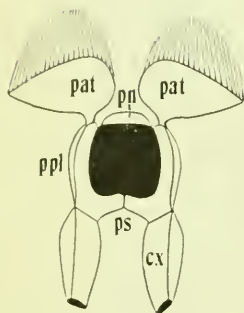


Fig. 2

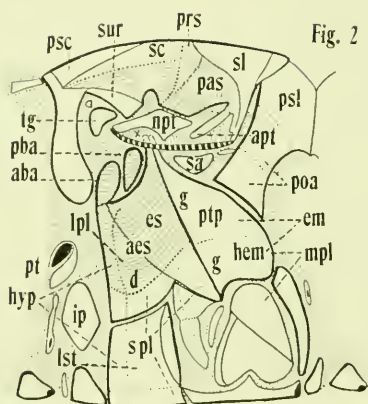


Fig. 3

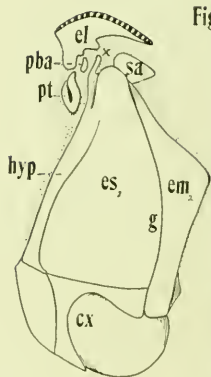


Fig. 4

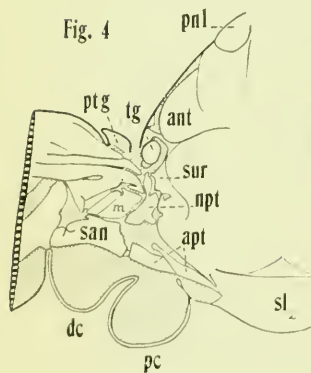


Fig. 5

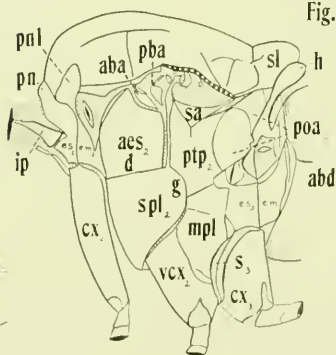
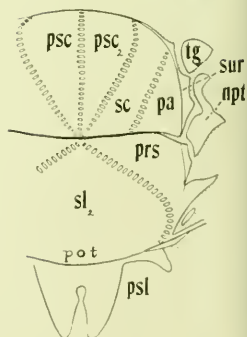


Fig. 6



Sclerites of Insects.

- 1910b. Snodgrass. The Thorax of the Hymenoptera. Proc. U. S. Nat. Museum, Vol. 39, pp. 37-91.
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ABBREVIATIONS.

aba. Anterior basalar.	pba. Posterior basalar.
abd. Abdomen.	pc. Proximal calypter.
aes. Anepisternum.	pn. Pronotum.
ant. Antealare.	pnl. Pronotal lobe.
apt. Adanal pterale.	poa. postalare or pleurotergite.
cx. Coxa.	pot. Posttergite.
d. Suture marking off anepisternum (aes).	ppl. Propleuron.
dc. Distal calypter.	prs. Prescutellum.
em. Epimeron.	ps. Prosternum.
es. Episternum.	pse. Prescutum.
g. Pleural suture.	psl. Postscutellum.
h. Halter.	pt. Peritreme.
hem. Hypoëpimeron.	ptg. Parategula.
hyp. Hypopteron.	ptp. Pteropleurite.
ip. Interpleurite (lateral cervical).	s. Sternum.
lst. Laterosternite.	sa. Subalare.
lpl. Lateropleurite.	san. Basanal pterale.
m. Medipterale.	sc. Scutum.
me. Meron.	sl. Scutellum.
mpl. Meropleurite (me + hem).	spl. Sternopleurite.
npt. Notopterale.	sur. Suralare.
pa. Parapsides.	tg. Tegula.
pas. Parascutellum.	tn. Trochantin.
pat. Patagia.	vex. Veracoxa.
	x. Pleural wing-fulcrum.

The subscripts 1, 2 and 3 denote that the sclerite in question belongs to the pro-, meso-, or metathorax.

EXPLANATION OF PLATE VII.

- Fig. 1. Prothorax of *Agrotis pronuba*, showing patagia (pat). Based on Fig. 154 of Kolbe's "Einfuehrung in die Kenntniss der Insekten."
 Fig. 2. Lateral view of ground plan of typical thoracic segment.
 Fig. 3. Lateral view of mesothorax of *Dytiscus*.
 Fig. 4. Dorsal view of mesothorax of *Tabanus*. Left half alone depicted.
 Fig. 5. Lateral view of thorax of *Leptis*.
 Fig. 6. Dorsal view of mesothorax of *Xiphidria*. Right half alone depicted. The region "pot" is not represented in *Xiphidria* itself, but is present in the more primitive saw-flies, such as *Tenthredo*, *Macroxyela*, etc.

NEW SPIDERS FROM THE NEIGHBORHOOD OF
ITHACA, N. Y.

BY J. H. EMERTON,

BOSTON, MASS.

In the spring of 1911 the writer visited in company with Nathan Banks the localities around Ithaca, N. Y., from which came the spiders described in the Proceedings of the Acad. Nat. Sci. of Philadelphia in 1892. Our main object was to collect material for the revision of Mr. Banks's early descriptions, but naturally several undescribed spiders came to hand, and more were added from collections made the following autumn by Mr. C. R. Crosby, and these are described in the following paper. Besides the undescribed species, several described elsewhere were found for the first time at Ithaca. Among these are *Ceratinopsis auriculatus*, *Cryphoecca montana* and *Hahnina brunnea* described by J. H. Emerton in Trans. Conn. Acad., 1909. A knapsack having been left for a few minutes on the ground, a fine male of *Pellenes roseus* was found upon it. The male of *Pirata montana* Em., which was unknown until 1910, was found in several localities in considerable numbers.

***Enoplognatha pallida* new species.**

Female, 3 mm. long, a little smaller than *E. rugosa*, pale yellowish without any markings. Legs slightly longer than in *rugosa*. Front eyes in a straight line, the middle pair much smaller than the others. Mandibles as in females of the other species with three teeth on the end, the middle tooth largest. The sternum is as wide as long, more like *marmorata* than *rugosa*. The epigynum has a wide middle lobe like *rugosa*, but it is narrowed in front into a T shape and in front of this is a short, irregular middle ridge.

Ithaca, N. Y., Coy Glen, May, 1911.

***Pedanostethus terrestris* new species.**

The four described species of *Pedanostethus* resemble each other closely in form, size and color, but are distinguished by differences in the male palpi and the epigynum, which appear to be constant. This species resembles closely *P. riparius* and cannot be distinguished from that species except by peculiarities of the male palpus. In the four other species the tarsus of the male palpus has a deep notch near the tip. In this species the notch is nearer the middle of the tarsus and the two thick hairs, which in *riparius* are terminal, are here farther down near the notch. The process in the outer side of the

notch is turned outward and sharply curved upward at the end, Fig. 2. Both the hard processes of the palpal organ are smoother and more slender than they are in *P. riparius*, Fig. 2b.

Ithaca, N. Y., and Cornwall, N. Y.

Gongylidium ornatus new species.

This species is about 3 mm. long and instead of the usual dull gray is brightly colored in dark gray and orange. The abdomen is dark above and below and the mandibles and head are dark as far back as the dorsal groove with the dark area sharply defined. The legs and hinder part of the cephalothorax are orange without markings. The head is but little elevated in either sex as in *trilobatus*, *probatus*, etc. The mandibles are stout and at the base rounded out in front. On the outer side they are roughened with small teeth not arranged in a definite row. In the males the outer teeth are somewhat larger and there is a prominent tooth on the front of the mandible near the end. The male palpi are long, the tibia a little longer than the patella, Fig. 3b. The patella has a spur on the under side near the end as in *Erigone*. The tibia is slightly widened at the end and only slightly toothed. The tarsus is oval and small, hardly wider than the tibia.

Ithaca, N. Y. Marsh at head of Cayuga Lake in December, C. R. Crosby.

Gongylidium undulatus new species.

This species resembles *G. (Tmeticus) contortus* Em. Its size is the same, 1.5 mm. long, and it has the same pale dull color as most of this genus. The mandibles of the male have a tooth on the front near the end and a row of a few hairs on the outer side, each with a slight elevation around the base. The male palpi suggest those of *contortus* but the process on the upper side of the tibia is much larger, so that the apparent "contorsion" is less. The hard processes on the end of the palpal organ are also larger. Fig. 4.

Ithaca, N. Y., May, 1911, Buttermilk Creek and marsh at inlet of Cayuga Lake.

Tmeticus index new species.

A minute spider resembling *T. entomologicus* Em., 1911, and *T. acuminatus* Em., Bull. Am. Mus. Nat. Hist., 1913. The lateral eyes are closer to the middle eyes than in *entomologicus*. The tarsi are round and the palpal organ simple as in that species, but the tarsus has a long sharp point directed straight forward. The length is less than 2 mm., the colors dull, translucent gray with darker color between the eyes and on the end of the tibia of the palpus.

Freeville, N. Y., May, 1911.

Tmeticus conicus new species.

Male, 2 mm. long. Cephalothorax dark brown. Abdomen dark gray with light marks on the back in two pairs on the front half and in a single row

behind. The legs are pale without markings, and the palpi are pale except the tarsus. The tarsus and palpal organ are large, thickened at the base and pointed at the end. The tarsal hook is turned outward with a notch near the end, and has the general shape of the hook in *Tmeticus terrestris*. The mandibles are turned outward at the ends with a small tooth opposite the end of the closed claw.

Ithaca, N. Y., December, 1911, C. R. Crosby.

***Linyphia cayuga* new species.**

Both sexes, 3 mm. long. Cephalothorax longer than wide, the head elongated in both sexes. The color of the cephalothorax and legs is dull yellow in the female and orange in the male with the ends of the joints a little darkened. The cephalothorax has three gray longitudinal stripes in both sexes, the lateral stripes more or less broken into four spots. The abdomen of the male is dark gray with a trace of light spots on the dorsal side near the front end. The abdomen of the female is dark underneath, with a few irregular small light spots. On the back it has a dark and light pattern shown in Fig. 7. The epigynum is covered by a wide smooth plate, behind which are two shallow openings separated by a short middle lobe. In the male the mandibles are two thirds as long as the cephalothorax. The male palpi resemble those of *L. mandibulata*, the large appendage of the base of the palpal organ is as long as the tarsus and deeply notched at the distal end. The tube is long and coiled in one and a half turns. The young of both sexes are colored like the female with all the markings less distinct.

Marsh at the head of Cayuga Lake, Ithaca, N. Y. Adults in May, and young in December.

EXPLANATION OF PLATE VIII.

Fig. 1. *Enoplognatha pallida*, mandibles and front row of eyes. 1a, head and eyes turned up at an angle of forty-five degrees. 1b, epigynum.

Fig. 2. *Pedanostethus terrestris*, right palpus of male, showing notch and pair of hairs on the outer side. 2a, inner side of same palpus. 2b, inner side of palpus of male *Pedanostethus riparius* for comparison.

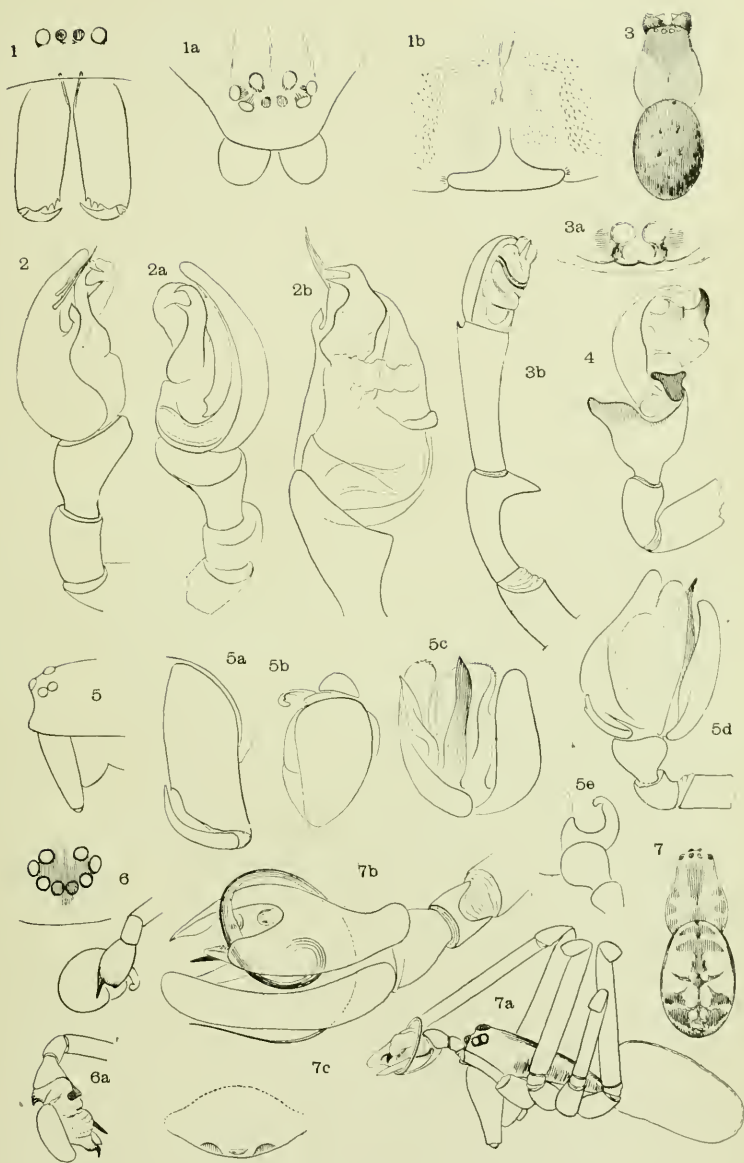
Fig. 3. *Gongylidium ornatus*, back of male showing color areas and ornamentation of mandibles. 3a, epigynum. 3b, palpus of male.

Fig. 4. *Gongylidium undulatus*, palpus of male.

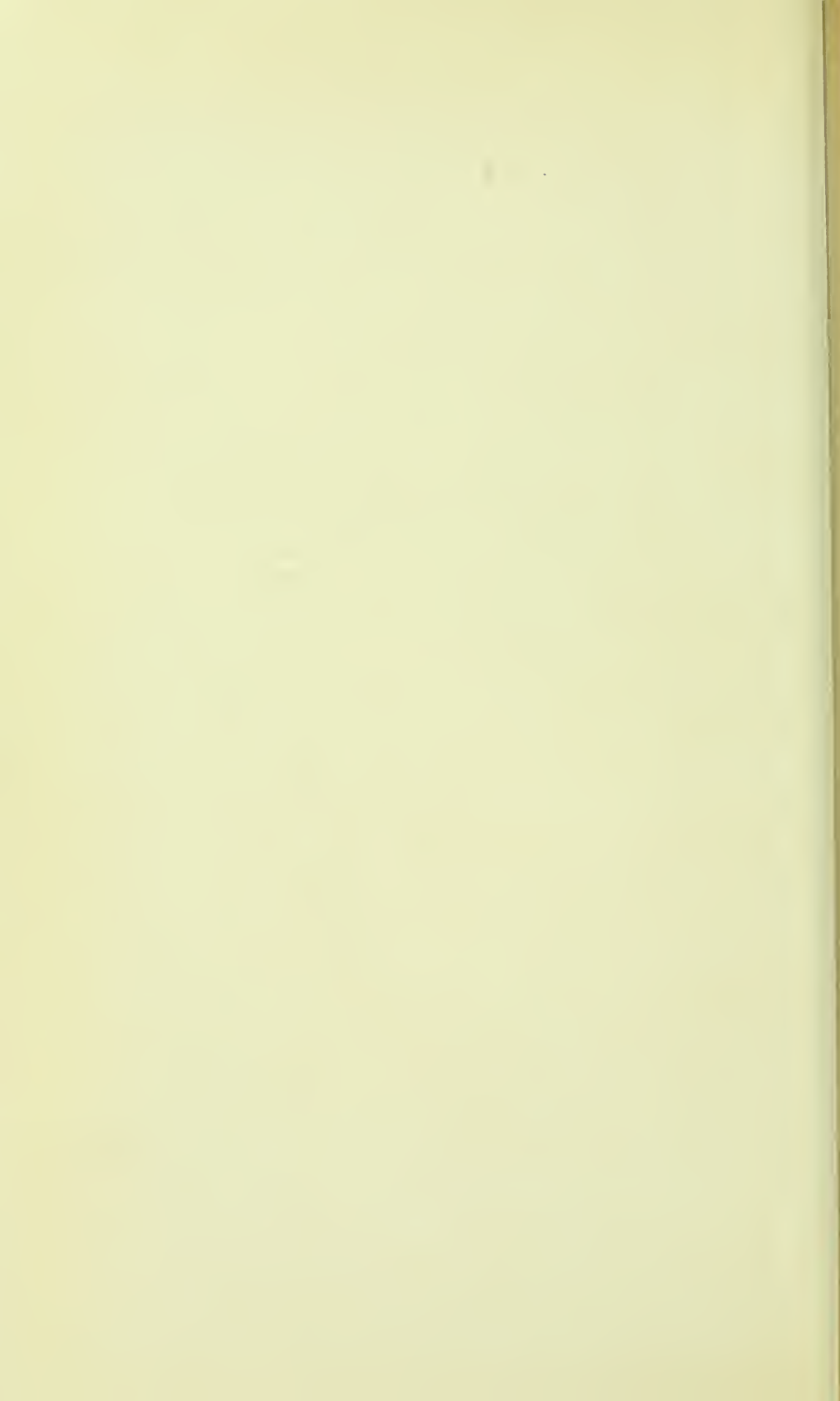
Fig. 5. *Tmeticus conicus*, head of male. 5a, mandible. 5b, male palpus from above showing spread of the tarsal hook. 5c, tarsus and palpal organ from inner side. 5d, outer side of palpal organ. 5e, tarsal hook.

Fig. 6. *Tmeticus index*, eyes and palpus of male from above. 6a, outer side of male palpus.

Fig. 7. *Linyphia cayuga*, dorsal markings of female. 7a, cephalothorax and palpus of male. 7b, male palpus from below. 7c, epigynum.



Araneida.



MISCELLANEOUS NOTES.

Additions to the Orthoptera Known to Occur in North Carolina.—

Mr. H. G. Barber and the writer found it cold when we went insect collecting on April 4, 1914, in the vicinity of Wilmington, N. C. The branches of many of the evergreen trees had been broken down some weeks previous to our visit by a heavy fall of snow and the event was considered a memorable one. The same story of a backward season was told at Southport and at Southern Pines. We, however secured a few insects, and the collection of Orthoptera numbered thirteen species, three of which appear to be additions to the list of those recorded from the State.

Anisolabis annulipes Lucas.

Wilmington, April 4. Under board; three individuals.

Spongiphora brunneipennis Serv.

Wilmington, April 5, 1 female.

Ischnoptera coulouiana Sauss.

Wilmington, April 4; Southport, April 13. Nymphs under bark.

Nomotettix cristatus arcuatus Hancock.

Southport, April 10, 1 female. This appears to be an addition to the list of the Orthoptera of the State. The specimen was determined by Mr. Morgan Hebard, who has recently studied the group.

Tettigidea lateralis Say.

Writesville, April 6; a number cast ashore on the ocean beach; Wilmington, April 7, 2 males; Southport, April 10, 4 females.

Amblytropidia occidentalis Sauss.

Wilmington, April 7, 2 males, 4 females; Southern Pines, April 13, 1 male, 1 female.

Arphia granulata Sauss.

Wilmington, April 11, 1 male. This appears to be an addition to the list of the Orthoptera of the State.

Arphia sulphurea Fab.

Southern Pines, April 13, 1 male.

Chortophaga viridifasciata DeGeer.

Wilmington, April 7, 1 male; Southport, April 10, 3 males, 3 females; Southern Pines, April 13, 1 male.

Schistocerca americana Drury.

Wilmington, Southport, Southern Pines. Many seen at all three localities.

Schistocerca damnifica Sauss.

Wilmington, April 5, 7, 11, 7 males; Southport, April 10, 2 males; Southern Pines, April 13, 8 males, 3 females.

Leptysma marginicollis Serv.

Wilmington, April 7, 2 males, 2 females.

Stenacris vitreipennis Marsch.

Wilmington, April 7, 1 male, beaten from a bush into an umbrella by Mr. Barber. This appears to be an addition to the list of the Orthoptera of the State.

Diapheromera carolina Scudder.

This species was described from North Carolina, and a specimen collected by Mrs. Annie Trumbull Slosson at Lake Toxaway, N. C., was recorded in this Journal, Vol. XXI, p. 81, March, 1913.

Preliminary Studies of North Carolina Orthoptera, by James A. G. Rehn and Morgan Hebard, Proc. Acad. Nat. Sci. Phil., Nov. 1910, gives a considerable list of the Orthoptera of the State together with references to the literature. The Orthoptera of North Carolina, by F. Sherman, Jr., and C. S. Brimley, Entomological News, Vol. XXII, pp. 387-392, Nov., 1911, records one hundred and fifty-seven species from the State.

WM. T. DAVIS.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF MAY 5, 1914.

A regular meeting of the New York Entomological Society was held May 5, 1914, at 8.15 P. M., in the American Museum of Natural History, President Dr. Raymond C. Osburn in the chair and seventeen members and four visitors, including Dr. N. L. Britton, present.

The curator reported recent work on the local collection, including the arrangement of Bombyliidae and Tabanidae.

Mr. Davis announced the death of John A. Grossbeck, in Barbados, on April 8, and read part of a letter from William J. Gerhard, in which the attainments of Mr. Grossbeck as an entomologist and the high esteem in which he was personally held were expressed. Letters from Dr. Henry Skinner, Dr. E. P. Felt, Mr. Nathan Banks and others were also at hand.

Mr. Davis moved that in place of formal resolutions the secretary be instructed to send a letter to Mrs. Grossbeck expressing the sorrow of all the members of the Society and the affectionate remembrance in which our librarian and friend would always be held.

Letters from Dr. W. E. Britton, offering to donate copies of Bulletin 181, dealing with Connecticut Lady Beetles, and from the President of the Agassiz Association, inviting the members to visit Arcadia, were read.

A catalogue of Linnean specimens by the general secretary of the Linnean Society of London was exhibited by Dr. Lutz.

Mr. Davis, under the title "Notes on Spring Collecting in North Carolina," described the journey he made April 5 to Wilmington, Southport, Southern Pines and Raleigh, N. C., in part with Mr. Barber, showing many of the insects he caught and photographs of the regions he visited. A few of the plants, including yellow jessamine, live oak, and American beech, were shown, and judging by the latter especially, Mr. Davis thought the season at Wilmington about five weeks ahead of New York. Dr. Britton later said that this coincided with the usual estimate of spring advance on the Atlantic coast at the rate of thirteen miles per day, since the distance between Wilmington and New York, 450 miles, was almost exactly 35×13 .

Mr. Davis spoke of collecting on the beach and the circumscribed area in which the wash-up was found productive, similar to, but even more pronounced than the same condition observed on Long Island. He described the low, flat lands about Wilmington, often overflowed or swampy, the extensive abandoned rice fields, sometimes overgrown with golden club in April, the splendid forests, in which three species of pine and enormous beeches were seen and the more sandy areas in which *Cicindela scutellaris carolina* and other species were caught.

His pictures of Southport showed the cedars, the large live oaks growing in the streets and especially in one fine picture, thick about the school house, with the children romping beneath them. Mr. Davis spoke enthusiastically of this town, but according to Mr. Barber's remarks later in the evening, even his enthusiasm failed to do full justice to its many attractive features.

At Southern Pines, Mr. Davis visited Mr. and Mrs. A. H. Manee, and photographs of them and their home were included in his exhibit. The rattling noise made by *Brachys ovata* within the oak leaves it mines, previously noticed in Florida, was here described to Mr. Davis by Mr. Manee, who said his attention had first been drawn to it by an old dorky.

At Raleigh, Professor Metcalf, Franklin Sherman, C. S. Brimley and other friends were seen and some desirable grasshoppers were obtained. Several large boxes of the insects captured on the trip were shown, including *Buprestis decora*, *Thecla damon*, many other species of Lepidoptera, eight species of dragon flies, Syrphids for Dr. Osburn, thirteen species of grasshoppers, of which two proved new to the N. C. State List, and many insects of other orders. The grasshoppers will later form the subject of a special article by Mr. Davis.

Dr. Lutz exhibited a large number of photographs obtained during his recent visit to Porto Rico and many colored slides loaned by Professor Cramp-

ton. Mona Island, with its level top elevated about 150 feet above the sea, formed of limestone, full of caves, densely clothed with vegetation; Desecco, rising in a series of peaks, with its stratified rocks, as well as Porto Rico itself, formed the subject of his remarks. The beauty of the scenery in the last named mountainous island, which, Dr. Lutz said, was about half the size of New Jersey, but twice as high, was shown by many pictures, while others exhibited special features like the tree ferns, the isolated limestone hills near the coast, the Indian carvings, the curious spider webs near cave entrances, the cocoanut palms, bananas and other tropical plants, including one locally called "Woman's Tongue," from the continual rattling of the dried pods of beans. On account of the specimens being still unlabeled, the many insects obtained were not exhibited, but Dr. Lutz remarked on the unexpected absence of *Cicindelidæ* on the sea beaches.

Dr. Britton, on request, spoke of West Indian distribution, as shown in plants, saying that it was not necessary to assume land connection to explain existing plant population, the forces of wind and water being sufficient. The hurricane winds are known to transport light material for enormous distances; and while this view may not be wholly defensible, the forces mentioned are very potent. The flora is more or less alike on all the volcanic ash islands, as it is also on the larger islands, which may therefore have been once connected; but such a connection as to Porto Rico is very doubtful. Mona Island, lying between Porto Rico and Hispaniola, contains in its twenty square miles no botanical element that could not apparently have been transported by wind or sea. In the Bahamas the plant population, apart from endemic species, is closely related to that of the mainland. To deny absolutely the possibility of land connections would be fatuous; but to claim that the great bulk of the species have reached their present situation by forces of nature subsequent to the formation of the islands seems reasonable. On the other hand, the effectiveness of the Mona Passage, eighty miles wide, between Porto Rico and Hispaniola as a barrier is shown by its having stopped many species.

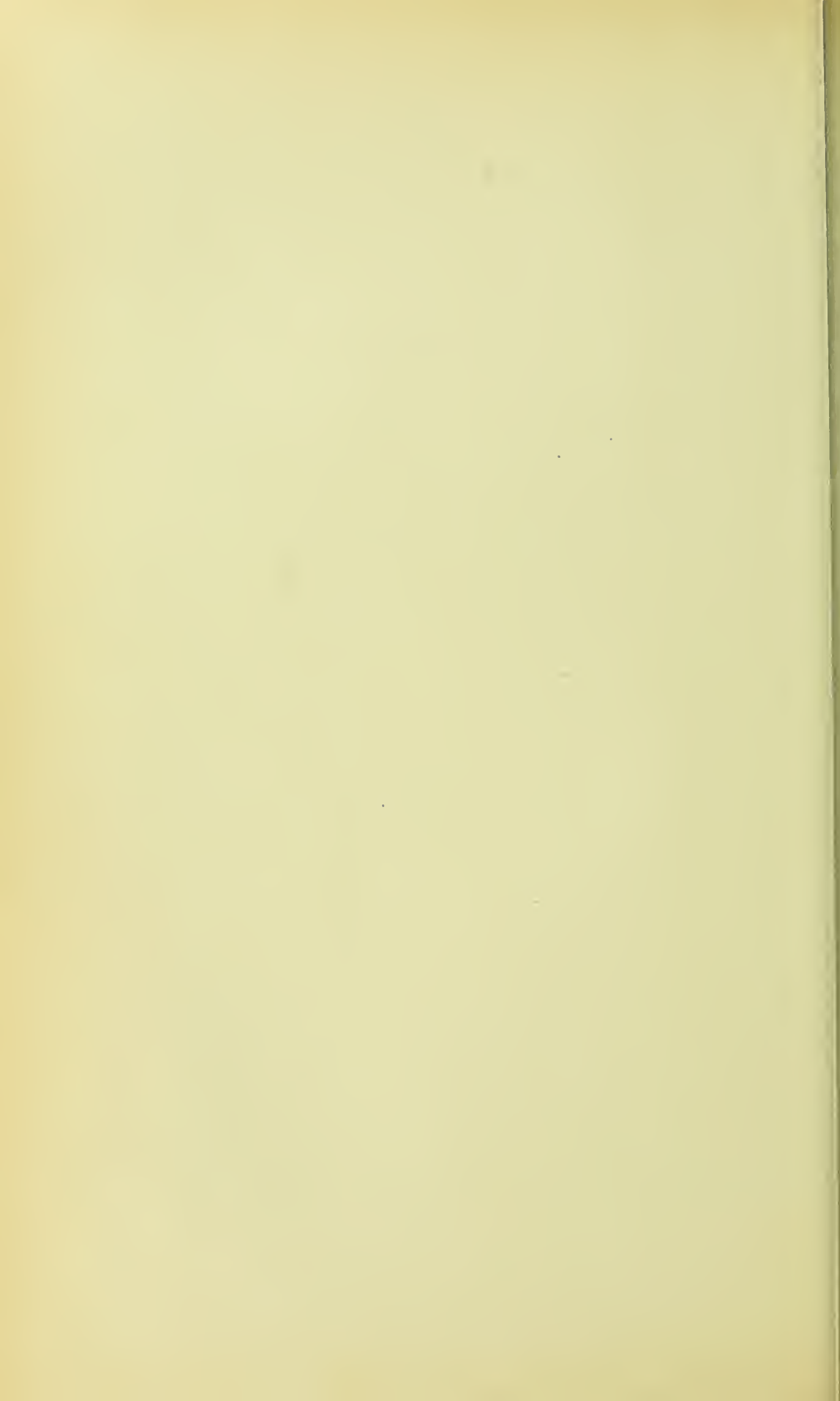
Continuing, Dr. Britton said the isolation of Jamaica, as a floral province, had been pointed out sixty years ago; Cuba, southern Florida, and the Bahamas appeared to constitute a second; the volcanic islands, from St. Kitt's southward, formed what might be called the fourth; the constitution of the third remains doubtful, awaiting zoological evidence to aid the botanical as well as more details of the latter. Hispaniola remains the least known and may ultimately be grouped with Cuba or with Porto Rico. No one can say which at present, although the greater alliance seems to be with Cuba according to recent authorities. Dr. Britton added that since the islands are all comparatively recent, geologically speaking, the Jurassic formation having only recently been detected in Cuba, correcting the previous impression that the Cretaceous was the oldest, the greatest difficulty in ascribing the distribution to wind and water lies in the question as to whether there has been sufficient time for these forces to effect it.

In answer to Dr. Lutz, Dr. Britton said he thought the flora of Porto Rico would eventually prove to be most closely related to that of St. Thomas, but sufficient data were not yet at hand for a definite statement.

Mr. Leng, on request, repeated his views that the occurrence in Cuba of many boreal genera of Carabidæ, beetles which from their habit of hiding under stones and logs are little liable to transportation by winds, and from their inland environment are even less liable to transportation by drift, made the acceptance of the theory difficult for a coleopterist. The specific identity of certain cosmopolitan species is admitted and the methods by which they have been transported by commerce are evident; the specific identity of a few seashore, salt marsh, and certain strong flying species is equally admitted and the operation of the forces of wind and water in carrying them may be accepted as plausible and as probable as the similar distribution of the seeds of plants by the same forces; but the number of such cases of specific identity is small and the difficulty is to account for the large number of cases of generic identity between the Carabid fauna of Cuba and that of the United States, amounting almost to absolute identity when comparison is made with a southern state, like Florida. Furthermore, the elevation of the sea bottom, supporting the coral reefs of the Cuban shore, of Florida and the Bahamas, the very places indicated by Dr. Britton as constituting a flora province, cannot fail to suggest a former land connection, which for the distribution of insects need not have been of great elevation, nor even more than temporary in character. If such an elevation is reasonably assumable, and it has already been advanced to account for the Carolinian character of part of the plants of Newfoundland, it would explain in a satisfactory manner the observed relationship. Mr. Leng added that the data for most of the islands were scanty, and beyond the Cuban relation, nothing definite could be stated.

Dr. Britton cited Bermuda as a certain example of an island, perched on the peak of a submerged volcanic mountain, the population of which, in plants and insects, much have reached it by wind, water or human agency, the flora of which, comprising about three hundred species, is all southeastern. He said that there were possibilities each way, but Bermuda furnishes an excellent example of what can be accomplished without land connection; and in view of the very long time during which the forces urged have been in operation, the known transportation of the eggs of Mollusca (presumably analogous to those of insects) by birds, in addition to the agencies previously mentioned, he leaned away from the theoretical land connection, though willing to consider it further if evidence were forthcoming.

Mr. Barber read a paper on "Hemiptera from Wilmington and Southport, North Carolina," illustrated by many specimens caught while there with Mr. Davis on his spring vacation. Fifty-four species of Hemiptera were taken, mainly Heteroptera; the best returns came from beating cedars and pines, though the beach wash-up yielded as many as twenty-five species, tempted abroad by the warmth of the preceding days. The absence of stones or other suitable shelter made the usual spring methods less productive than usual; and familiar forms predominated, though there were some conspicuous exceptions, like *Macrocephalus prehensilis*, *Banasa packardii*, *Zelus cervicalis*, *Z. bilobus*, *Panoniulus longulus*, species not found by Mr. Barber even in his two summers' work in Virginia.



THE NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except June, July, August and September) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

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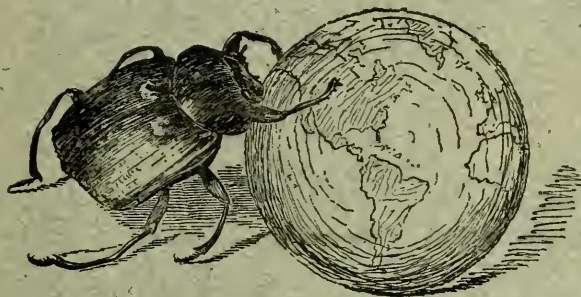
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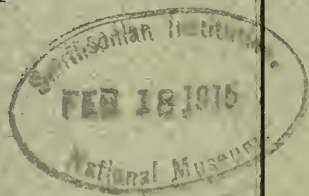


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John Arthur Grossbeck.

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JOHN ARTHUR GROSSBECK, WITH A BIBLIOGRAPHY OF HIS PUBLISHED WRITINGS.

BY WM. T. DAVIS,

NEW BRIGHTON, N. Y.

John Arthur Grossbeck was born in Paterson, N. J., of German parentage, February 2, 1883, and died on the Island of Barbadoes, April 8, 1914. He suffered from a form of diabetes for about a year and took this last journey with his devoted brother in the hope that his health might be benefited.

While as a boy he attended for a few years the public schools in Paterson, he was in fact chiefly educated out of school. His mother was a widow and poor and he had to go to work as soon as he was able, and being very able it was very soon. He worked for a farmer one summer, then in a factory, and next became a house painter. He learned this last trade pretty thoroughly. It was while he was a painter and long before he became of age that he began to make notes and drawings of the insects that he saw when he went afield, and as he did everything he undertook with much neatness and care, this enterprise was no exception.

He learned from what he read in a daily paper that Mr. Jacob Doll, of the Brooklyn Museum knew a lot about Lepidoptera, and so he took the first opportunity to call and show him his drawings in the hope that he might get names for the insects that had interested him so much. Mr. Doll has assured me that he had no difficulty in

identifying most of the species from the pencil drawings and notes. Later when Prof. John B. Smith, of New Brunswick, N. J., was looking for an assistant, both Mr. Doll and Mr. Engelhardt recommended Mr. Grossbeck for the position, which he secured. Thus he became associated in the work on New Jersey mosquitoes in 1903, and naturally from the environment became interested in Lepidoptera and particularly in the family Geometridæ. This last choice was no doubt brought about by the presence in New Brunswick of the Hulst collection. From what he learned in the Agricultural Experiment Station, and as a member of a correspondence school, he progressed rapidly and soon commenced publishing scientific papers.

Prof. Smith told me on several occasions that one of his best discoveries was Grossbeck. He would work both during office hours and out of them, as diligently and carefully as possible, his desire being to get the work well done, and usually it was so very well done that all were pleased. There are, and have been in the past, a great many clever entomologists, but it isn't so often that they combine cleverness and artistic neatness as well. This he displayed in his arrangement of collections to a marked degree. His ability to make detailed drawings of insects was of great service to Prof. Smith, and also to himself in his work on the Geometridæ as shown by the figures illustrating many of the papers mentioned in the bibliography. In this direction he was also always ready to assist his friends, and several are indebted to him for sketches to illustrate their papers.

On February 20, 1911, he became officially associated with the American Museum of Natural History, to which institution he gave his collection of insects, including a considerable number of types of Geometrid moths. In return the Trustees of the Museum elected him a patron. In 1911 he moved to Staten Island and in 1912 built a shingle covered bungalow in the picturesque Clove Valley, which he occupied with his wife and two infant sons.

While employed in New Brunswick Mr. Grossbeck was a member of the Newark Entomological Society, and served as its secretary for a number of years. At the time of his death he was librarian of the New York Entomological Society, and a member of the Staten Island Association of Arts and Sciences.

It has been a simple task to compile a bibliography of the writings of my friend, for like everything else that he had, his papers were in

order, and in fact most of his scientific writings had been bound into a volume, which I have often examined and which has aided me now. His last paper, one on the Lepidoptera of Florida, is to appear in the Bulletin of the American Museum of Natural History at an early date.

The portrait of Mr. Grossbeck accompanying this article was taken in 1904, but he had changed little in appearance during the last ten years. He was short of stature, slight in build and usually wore spectacles. His features reflected a straightforward honesty of purpose that was evident to all and which won the confidence of his acquaintances who naturally became his friends.

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REPORT ON A COLLECTION OF MEMBRACIDÆ FROM THE COLOMBIAN ANDES, TAKEN BY MR. JOHN THOMAS LLOYD.¹

By W. D. FUNKHOUSER,

ITHACA, N. Y.

Through the courtesy of Mr. John Thomas Lloyd I have been permitted to examine a small but very interesting series of insects belonging to the family Membracidæ, collected by Mr. Lloyd in the central Cordilleras in the spring of 1912, and representing a part of the collection made by Mr. Lloyd and Dr. A. A. Allen on their trip to this region. Only eight species are represented in this collection, but of these, one is new, and several of the others are of much interest on account of their rarity and the fact that they have seldom been mentioned in literature. The synonymy and bibliography of the South American forms of the Membracidae are in so much confusion

¹ Contribution from the Entomological Laboratory of Cornell University.

that I have thought it advisable to include the more important references to the species here mentioned.

The Membracidae were collected from two localities, "La Valle de las Papas" and "Almaguer." The former has been well described in Mr. Alexander's paper on the Tipulidae from this region (JOURN. N. Y. ENT. SOC., Sept., 1913, XXI: 3, 194) and the latter is mentioned in the same paper as including the village of that name and the "moss" forest on the mountain ridge west of the village. It was in this latter vicinity, on the trail, and at the edge of the forest that most of the membracids were taken.

The topography of the mountain sides throughout this region as described by Mr. Lloyd is most interesting, in that the forest zone does not begin until an altitude of about 10,000 feet is reached, and extends from that point upward to an altitude of 12,600 feet, above which the peaks are again free from trees to the summit. The absence of forests below the 10,000 feet line has not been explained, but Mr. Lloyd suggests that this area of the mountain sides may not receive the moisture laden winds which are intercepted by the peaks of the western range, while the area above is swept by these winds and is consequently humid and enabled to support vegetation. Both Dr. Allen and Mr. Lloyd have observed that the lower line of the forest seems to vary in altitude with that of the corresponding summits of the costal range, and average from 6,500 to 10,000 feet above the sea level.

In this forest the vegetation is so overgrown with moss that the plants and trees present a weird appearance, the trunks and branches seeming to be much larger than they really are, on account of the great loads of the moss and epiphytes which they are forced to bear (Pl. I, Fig. 1). The condition suggests the name "moss" forest, and on the trail through this forest insects were collected by sweeping and were taken from low plants and bushes.

At Almaguer the forest extends almost to the top of the mountain. The membracids were found at an altitude of 10,350 feet, just above the line at which the forest begins. Although the camp located at this place was only about thirteen miles from the village, the climatic conditions of the two localities were entirely different due to the difference in altitudes, the village being situated on the side of the range at an altitude of 7,500 feet and being without rain at a time

when the locality of the camp was in the zone of heavy precipitation. The specimens of membracids bear the date label March 11, 1912. Mr. Lloyd's field notes for this date record the weather as being rainy and cold, the rainy season having just commenced. The temperature on that date was 48° at 7:30 A. M. and 58° at noon. It is interesting to note that the temperature records showed an almost constant variation of ten degrees between the lowest and the highest temperature for each day.

The specimens from the Valle de las Papas were collected from March 21 to April 3. During this time it rained almost continuously and the locality was constantly submerged in heavy clouds; the altitude was 10,000 ft.

Subfamily MEMBRACINÆ.

1. *Campylenchia nutans* Germ.

1818. *Membracis nutans* Germ., Mag. Ent., IV: 28, 30.
 1835. Germ., Rev. Silb., LLL: 227, 14.
 1846. Fairm., Rev. Memb., 252, 33.
 1851. *Enchenopa nutans* Walk., List Hom. Brit. Mus., 482, 6.
 1858. *Membracis nutans* Stal, Rio Jan. Hem., II: 23, 7.
 1869. *Enchenopa nutans* Stal, Bid. Memb. Kan., 271, 4.
 1869. *Campylenchia nutans* Stal, Ofv. Vet. Ak. Forh., 271.
 1890. *Enchenopa nutans* Leth., Ann. ent. Soc. Fr., 153.
 1894. *Campylenchia nutans* Fowler, Biol. Cent. Amer., 12, 11, tab. 1, figs. 18, 18a.
 1903. *Enchenopa nutans* Buckton, Mon. Memb., 47, pl. 5, fig. 5.

Habitat.—Almaguer.

This species appears to be widely distributed throughout Central and South America. Canon Fowler records it from Panama, Bugaba, Caldera and David, and I have specimens from Brazil, Bolivia and British Guiana.

Subfamily HOPLOPHORINÆ.

2. *Alchisme inermis* Fairm.

1846. *Triquetra inermis* Fairm., Rev. Memb., 280, 1.
 1851. Walk., List Hom. Brit. Mus., 521, 1.
 1869. Stal, Bid. Memb. Kan., 266, 4.
 1903. *Microschema inermis* Buckton, Mon. Memb., 93, pl. 18, figs. 6, 6a, 6b.

Habitat.—Valle de Papas, Caqueta, Colombia; Almaguer.

A series of six specimens; three males and two females from the Valle de Papas, and one female from Almaguer.

Kirkaldy has proposed the name *Alchisme* for this genus (Entomologist, 1904, 37, p. 279) to take the place of the preoccupied genus *Triquetra*. It would seem at present a rather unnecessary multiplication of genera to raise Stal's subgenus *Microschema* to generic rank.

Subfamily SMILIINÆ.

3. *Ceresa vitulus* Fab.

- 1775. *Membracis vitulus* Fab., Syst. Ent., 677, 10.
- 1781. Fab., Spec. Ins., II: 317, 11.
- 1787. Fab., Mant. Ins., II: 265, 21.
- 1794. Fab., Ent. Syst., IV: 14, 25.
- 1803. *Centrotus vitulus* Fab., Syst. Rhyng., 20, 21.
- 1820. *Centrotus pallens* Germ., Mag. Ent., III: 25, 26.
- 1835. *Smilia vitulus* Burm., Handb. Ent., II: 137, 2.
- 1835. *Smilia pallens* Germ., Rev. Silb., III: 235, 6.
- 1840. *Membracis vitulus* Blanch., Hist. Nat. Ins., III: 180, 11.
- 1843. *Ceresa vitulus* Am. & Serv., Hem., 540, 1.
- 1846. Fairm., Rev. Memb., 283, 1.
- 1846. *Ceresa spinifera* Fairm., Rev. Memb., 284, 6.
- 1851. *Ceresa vitulus* Walk., List Hom. Brit. Mus., 525, 1.
- 1851. *Ceresa spinifera* Walk., List Hom. Brit. Mus., 526, 6.
- 1858. *Ceresa curvilinea* Walk., List Hom. Brit. Mus. Suppl., 132.
- 1858. *Ceresa excisa* Walk., Ins. Saund. Hom., 68.
- 1869. *Ceresa vitulus* Stal, Hem. Fab., II: 24, 2.
- 1869. Stal, Bid. Memb. Kan., 246, 11.
- 1877. Butler, Cist. Ent., II: 219, 27.
- 1890. Leth., Ann. ent. Soc. Fr., 153.
- 1894. Goding, Cat. Memb. N. A., 405, 36.
- 1895. Fowler, Biol. Cent. Amer., 102, 1.
- 1895. *Ceresa vitulus* var. *minor* Fowl., Biol. Cent. Amer., 103.
- 1903. *Ceresa minor* Buckton, Mon. Memb., 171, pl. 35, figs. 6, 6a.
- 1903. *Ceresa vitulus* Buckt. Mon. Memb., 172, pl. 35, figs. 8, 8a.

Habitat.—Almaguer.

I believe the above to be the correct synonymy of this species which is the type of Amyot and Serville's genus *Ceresa* and has had an interesting history in the literature of the Membracidae. It is apparently abundant throughout South America and extends in its range as far north as Mexico.

4. *Euretea personata* Stal.

- 1869. *Phacusa personata* Stal, Bid. Memb. Kan., 247, 2.
- 1895. *Euretea personata* Fowler, Biol. Cent. Amer., 113, 1, tab. 7, figs. 22, 22a.

Habitat.—Almaguer.

One specimen which I determine as *Euretea personata*. This specimen agrees with Stal's description and the species is excellently figured by Fowler. It is evidently rare.

5. *Ennya bicristata* Stal. (Pl. 2, figs. 1 and 2.)

1869. *Ennya bicristata* Stal, Bid. Memb. Kan., 238, 3.

Habitat.—Almaguer.

I have been unable to find any record of this species in literature since Stal's original description. It is a remarkable and beautiful insect.

6. *Heranice miltoglypta* Fairm. (Pl. 2, figs. 3 and 4.)

1846. *Thelia miltoglypta* Fairm., Rev. Memb., 306, 2, pl. 5, figs. 4, 12.

1851. Walk., List Hom. Brit. Mus., 555, 2.

1867. *Heranice miltoglypta* Stal, Oefvers. Vet-Akad. Forh., 554.

1903. *Thelia miltoglypta* Buckt., Mon. Memb., 194, pl. 42, figs. 3, 4.

1903. *Heranice* (?) *miltoglypta* Buckt., Mon. Memb., 218, 5.

Habitat.—Almaguer.

A series of thirteen specimens of this remarkable membracid. The species is easily recognized by its strongly keeled pronotum and general boatlike aspect. Mr. Lloyd reports that this species was very abundant along the trail through the forest of Almaguer and he was very fortunate in securing an excellent negative showing adults, nymphs and eggs all on one plant (pl. 1, fig. 2). This plant is described as being a low thorny bush with large leaves and spiny branches but it was unfortunately not determined in the course of the expedition. According to the field notes it was found commonly and averaged from two to three feet in height.

7. *Thrasymedes pallescens* Stal. (Pl. 2, figs. 5 and 6.)

1869. *Phacusa pallescens* Stal, Bid. Memb. Kan., 247, 1.

1894. Goding, Cat. Memb. N. A., 410, 49.

1895. Fowler, Biol. Cent. Amer., 111, 2.

1903. Buckton, Mon. Memb., 175.

Habitat.—Valle de Papas, Caqueta, Colombia.

This species evidently has a wide range since the type locality is Mexico. It is seldom to be found, however, in collections. I have adopted Kirkaldy's proposed name for the preoccupied genus *Phacusa* of Stal.

8. *Maturna lloydi* new species. (Pl. 2, figs. 7 and 8.)

The genus *Maturna* was erected by Stal to admit *M. ephippegera* of Fairmaire and is characterized by the rounded unprominent lateral angles and the compressed elevated dorsum. From the variation shown by the insects of the group to which this genus belongs, it would appear that these characters are not as distinct as might be desired, but at present the following species must be placed in the above genus.

Near *M. ephippegera* Fairm., but smaller, more slender, and with dorsal sinus and crests entirely lacking. Shape of pronotum recalling a small *Methesia* but with almost straight dorsum and only one discoidal area in tegmina. Sides of prothorax strongly three-ridged on each side; median carina prominent; posterior process barely exceeding apex of tegmina; base of tegmen strongly punctate and pubescent; color yellow-testaceous.

Head wider than long, very roughly sculptured, strongly punctate, pubescent; eyes brown, not prominent from front view but very prominent as seen from the side; ocelli white, prominent, equidistant from each other and from the eyes and situated slightly below a line passing through center of eyes; clypeus short, faintly trilobed. Pronotum long, narrow, rough, strongly punctate, very sparingly pubescent; front sloping backward above head, hollowed out above eyes; humeral angles rounded, not prominent; median carina strong and percurrent; three lateral ridges on each side, the two lower becoming obsolete before the humeral angles; dorsal line of thorax faintly sinuate, suddenly sloping downward behind middle; posterior process long, tectiform, gradually acute, extending just beyond the tips of elytra. Elytra more than half covered by the pronotum, proximal half coriaceous and opaque, densely punctured and pubescent; distal half hyaline with faint fuscous cloud at tip. Pectoral regions and undersurface of abdomen deep chocolate brown. Legs luteus; femora smooth and slightly marked with brown; tibiae finely spined. Type—Male. Length 6 mm.; width between humeral angles 2.3 mm.

Habitat.—Valle de Papas, Caqueta, Colombia.

EXPLANATION OF PLATES.

PLATE X.

Figure 1. Adults, nymphs and eggs of *Heranice miltoglypta* Fairm. Photographs by Mr. J. T. Lloyd.

Figure 2. Forest of Almaguer, showing moss-covered vegetation.

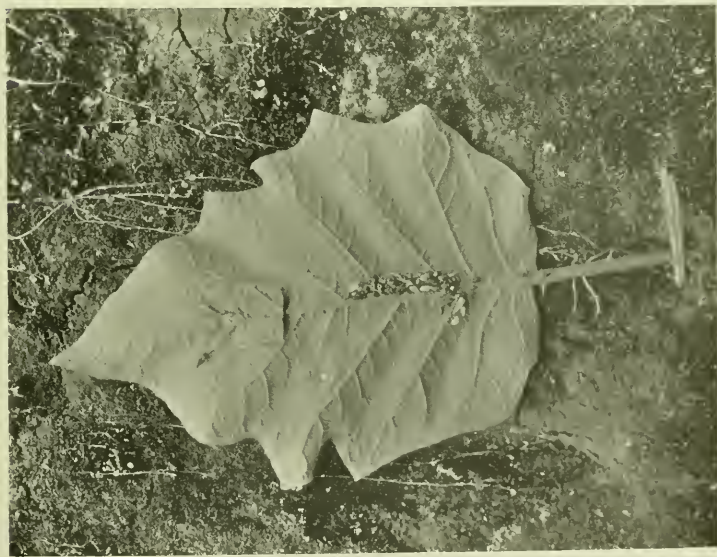


Fig. 1.

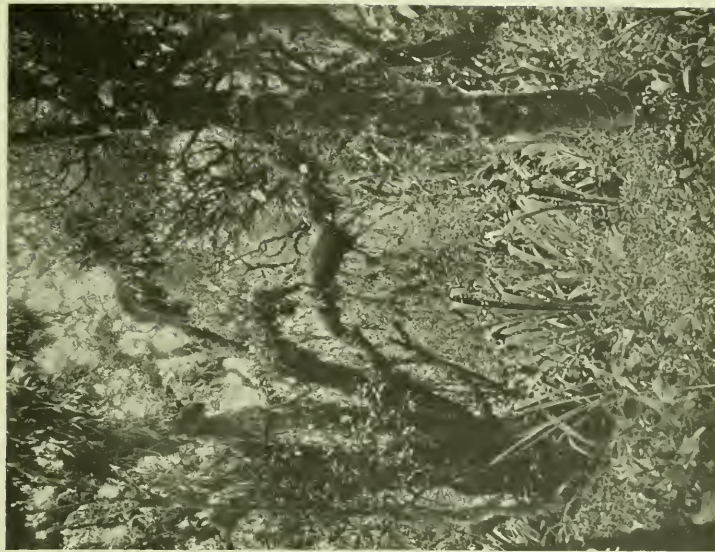
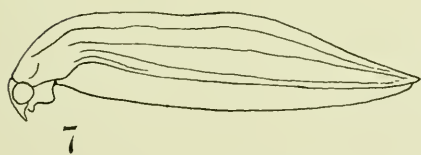
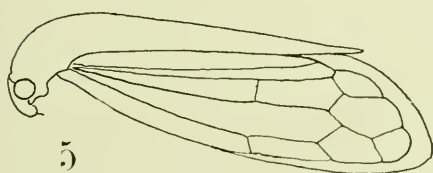
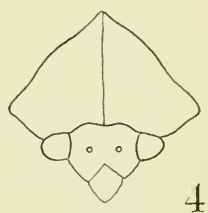
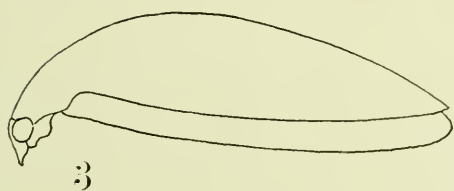
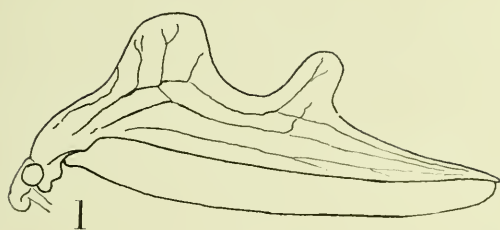


Fig. 2.

Membracidae.



Membracidæ.

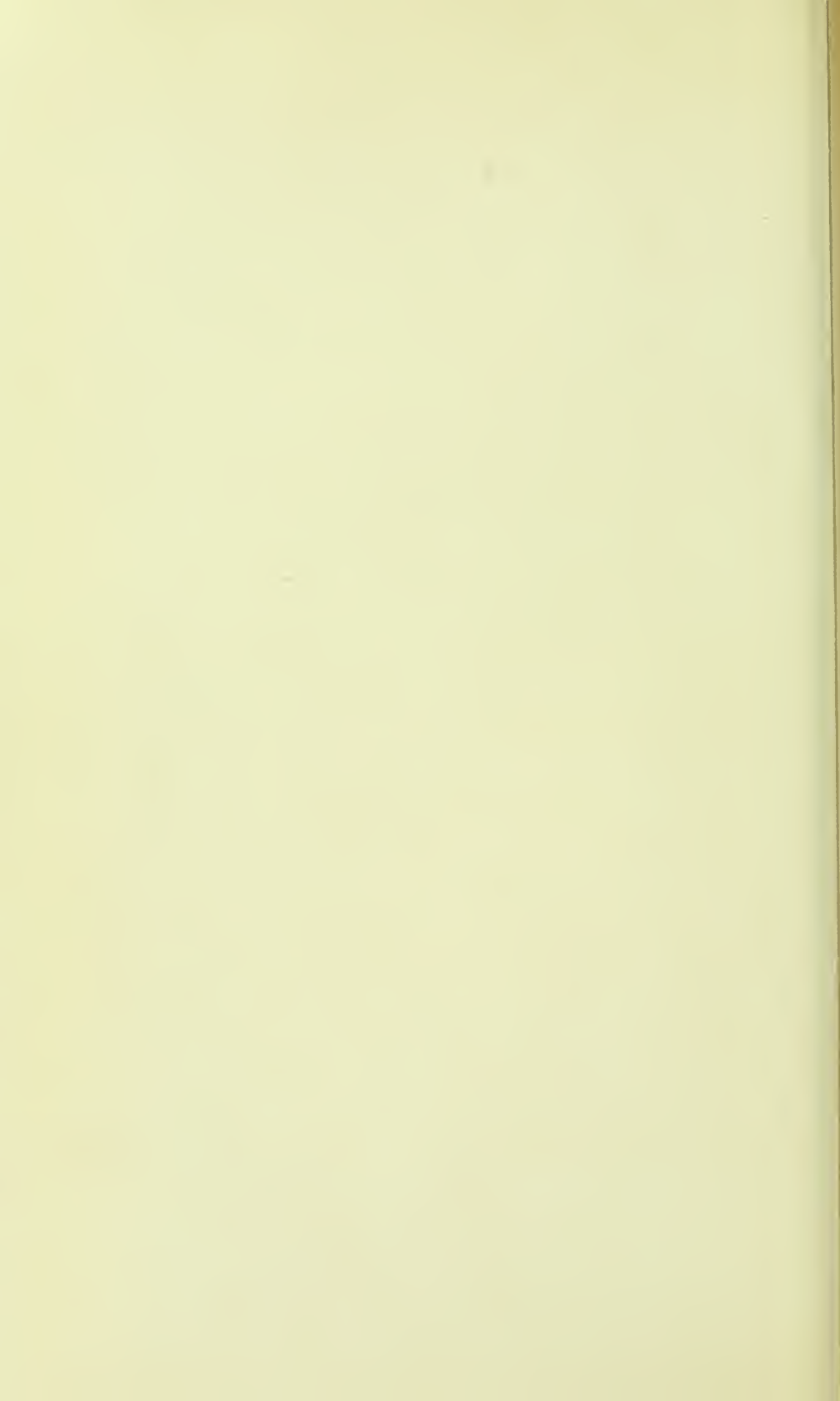


PLATE XI.

- Fig. 1. *Ennya bicristata* Stal, lateral outline.
Fig. 2. Same, frontal outline.
Fig. 3. *Heranice miltoglypta* Fairm., lateral outline.
Fig. 4. Same, frontal outline.
Fig. 5. *Thrasymedes pallescens* Stal, lateral outline.
Fig. 6. Same, frontal outline.
Fig. 7. *Maturna lloydi* sp. nov., lateral outline.
Fig. 8. Same, frontal outline.
-

SYNOPSIS OF NORTH AMERICAN SPECIES OF THE GENUS BEZZIA (CHIRONOMIDÆ).

By J. R. MALLOCK,

URBANA, ILLINOIS.

Owing to the fact that descriptions of species in all genera of the Ceratopogoninæ have been published at various times in different journals, and that heretofore no one has attempted to bring them together in the form of synoptic tables, it is an extremely difficult and tedious task to identify specimens belonging to this subfamily. Following my invariable custom when working over material belonging to other families, I have drawn up a synoptic table for the species of *Bezzia*, and hope that in presenting this for publication I may be able to materially assist students of Chironomidæ in identifying their species. I have already in print synopses of several genera, and in this paper present one which includes all the species known to me from North America which belong to the genus *Bezzia*.

The members of this genus may be separated from all others in Ceratopogoninæ by the absence of the second vein, or, in other words, of the cross vein connecting the first and third veins; by the absence of surface hairs from the wings; the absence of empodia; and by the presence of thornlike bristles on the ventral surface of at least one pair of the femora. *Probezzia* differs from *Bezzia* only in having the femora without thorns.

None of the species of *Bezzia* are common with the possible exception of *setulosa* Loew, which is the only one known in the early

stages. Professor Johannsen describes the larva and pupa of this species in Bulletin 86 (1905) of the New York State Museum, p. 102, and the writer has also succeeded in rearing the species.

Descriptions of three species are given in this paper, the types being deposited in the collection of the Illinois State Laboratory of Natural History. The species taken by the writer have all been either swept from vegetation near streams, or taken on windows, or at rest on houses, etc., in similar situations.

This paper is published by permission of Dr. S. A. Forbes, State Entomologist of Illinois.

SYNOPSIS OF SPECIES.

1. Wing with two black spots *punctipennis* Williston.
Wing unspotted 2
2. Only the fore femora with spines 3
At least fore and hind femora spinose 10
3. Halteres black 4
Halteres pale, rarely brownish 5
4. Claws simple *venustula* Williston.
Claws with central tooth *flavitaris* n. sp.
5. Fifth hind tarsal joint with ventral spines 6
Fifth joint of hind tarsus unspined 7
6. Third vein extending six sevenths of the wing length; fourth vein forking slightly before the cross vein *setipes* Coquillett.¹
Third vein extending three fourths of the wing length; fourth vein forking considerably beyond the cross vein *expolita* Coquillett.
7. Hind tibiae with distinct bristles *media* Coquillett.
Hind tibiae without distinct bristles 8
8. Abdomen black *pruinosa* Coquillett.
Abdomen in part pale yellow 9
9. Abdomen pale yellow, dorsum of first segment brown. *varicolor* Coquillett.
Abdomen pale yellow, apical half blackened *apicata* n. sp.
10. All femora with one spine *barberi* Coquillett.
Femora otherwise than above 11
11. Only fore and hind femora spined 12
All femora with spines 13
12. Last tarsal joint spinose ventrally; halteres yellow *setipes* Coquillett.
Last tarsal joint without spines; halteres black *dentata* n. sp.
13. All femora spinose on almost their entire length *johnsoni* Coquillett.
Femoral spines confined to apical half 14
14. Halteres white; abdomen white, fuscous-tinged; hind tibiae spinose.
setulosa Loew.

¹ See also section 11.

- Halteres black or brown 15
15. Halteres brown; third vein extending four fifths of the wing length; one claw on each tarsus with central tooth *pulverea* Coquillett.
- Halteres black; third vein extending three fourths of the wing-length; both claws on tarsi with a central tooth *dentata* n. sp.

It should be borne in mind that the sexes of many of the species in Ceratopogoninae differ very considerably from each other in color, venation, and leg armature, and in using the above table care will be required to avoid misinterpretation. The females are much more common than the males, and as an indication of this I may mention that only *expolita* of the genus *Bezzia* was described from the male alone, while but two others, *punctipennis* and *setulosa*, were represented by both sexes when the original descriptions were written. It will thus be seen that there is some probability that the synopsis here given will not prove altogether reliable for the identification of males of the described North American species of this genus, but it will serve for the identification of the females.

Bezzia flavitarsis new species.

Female.—Shining black. Head black, flagellum of antennae, and the palpi brown. Disc of mesonotum and scutellum glossy black; pleurae shining, slightly brownish on the lower portions. Abdomen shining black. Legs black, fore femora except the dorsal surface, mid femora narrowly on the ventral surface, fore and mid tibiae at apices, and the entire tarsi of all legs brownish yellow. Wings clear, veins yellow. Halteres black, stems partly yellowish, apices of knobs brown. All bristles and hairs black.

Eyes distinctly separated, the frons about one fifth as wide as head; antennae slender, last five joints elongated, the entire length of each antenna equal to that of head and thorax combined; proboscis much shorter than head. Mesonotum with numerous closely placed short hairs; a group of distinct setulose hairs above and in front of wing base, and two to three in front of lateral anterior angles of scutellum on mesonotum; scutellum with very weak discal hairs and about eight marginal setulae. Abdominal segments almost bare. Legs of moderate strength, fore femora slightly thickened; ventral surface of fore femora with four to five distinct spines, the other femora unspined; hind tibiae with the hairs on dorsal surface rather setulose; basal joint of hind tarsi as long as the next three joints combined; fourth joint about half as long as fifth; claws equal, rather short, not more than half as long as fifth joint, the latter without ventral spines, both tarsal claws with a distinct tooth on inner surface at middle. Wings with third vein extending three fourths of the wing length; first vein joining costa very slightly before middle of last section of third; media forking before the cross vein, the base of its posterior

branch indistinct; cubitus forking slightly distad of the cross vein, both of its branches slightly arcuate. Length, 2.25 mm.

Type locality: Monticello, Ill., June 21, 1914 (J. R. Malloch).

***Bezzia apicata* new species.**

Male.—Head black; scape of antennæ black, flagellum, except joints fourteen and fifteen, which are blackened, pale yellow; antennal plumes pale yellow; palpi brown. Thorax deep black, disc subshining, a large white pollinose spot behind each anterior angle on the submedian line, each spot being carried posteriorly for a short distance as a narrow stripe, giving it the appearance of a cornucopia with the wide end towards the anterior margin of disc; scutellum black, subopaque; pleuræ subshining on upper, glossy on lower, half. Abdomen whitish yellow, apical three segments and the hypopygium shining black. Legs yellow; coxæ, a distinct band before apex of fore femora, an indistinct one before apex of mid femora, the apical fifth of hind femora, and an indistinct band on fore tibiæ and the apices of all tibiæ, black; tarsal claws black. Wings clear, veins almost colorless. Halteres whitish yellow. Thoracic bristles black, the soft hairs on other parts of body pale.

Antenna about 1.5 times as long as head and thorax together, joints eleven to fifteen elongated, basal joint globose, large; eyes separated. Mesonotum with surface slightly granulose, the discal hairs short, rather soft, and numerous, bristles as in *flavitaris*; scutellum with six marginal bristles. Hypopygium longer than last segment, the lateral arms slender. Legs slender, fore femora not thickened, the ventral surface with five to six thorns, the other femora without thorns; hind tibiæ with distinct soft hairs, but without setulæ; basal joint of hind tarsi subequal to the length of the next three joints combined; fifth joint about three times as long as fourth, without ventral spines; tarsal claws equal, simple, their length about half that of fifth joint. Third vein two thirds of the wing length; first vein extending to middle of last section of third; media forking at cross vein, the posterior branch indistinct at base, forming an acute angle with anterior branch; cubitus forking midway between the cross vein and apex of first. Length, 1.5 mm.

Type locality: Muncie, Ill., May 24, 1914 (J. R. Malloch).

***Bezzia dentata* new species.**

Female.—Shining black. Head black; antennæ brown, apex of second joint and bases of the short joints of flagellum yellowish; palpi brown. Mesonotum with whitish pollinose markings as in *apicata*, postnotum and upper half of pleuræ covered with sparse whitish pollinosity, the lower half of latter glossy black. Abdomen unicolorous black, slightly shining. Legs black, fore femora, except on the dorsal surface, mid femora on basal half of the same surface, fore tibiæ at bases, fore and mid tibiæ at apices, and all the tarsi yellowish. Wings clear, veins brownish. Halteres black, stalks yellow at bases. Bristles on thorax black, the soft hairs on legs pale.

Eyes distinctly separated; antennæ slender, in length equal to about 1.5 times that of head and thorax combined, joints eleven to fifteen much elongated, the hairs on basal half of flagellum about equal in length to the joints on which they are situated. Mesonotum with numerous short setulose hairs on disc, the posterior half with two rows of three distinct bristles, situated on the lines generally occupied by dorso-centrals; the group of bristles in front of wing-base strong; scutellum short, its margin with about six bristles. Surface of abdomen with very short hairs. Legs of moderate strength, fore femora slightly thickened; thorns on femora as follows: fore, five or six; mid, one or two; hind, five or six; dorsal surface of hind tibiæ with the hairs setulose; basal joint of hind tarsi almost as long as remaining joints together; fourth joint very short, not over half as long as fifth, the latter without ventral spines; claws equal, rather short, about half as long as fifth joint, each with a distinct central tooth on inner side at middle. Third vein extending more than two thirds of the wing-length; first vein extending two fifths of the length of last section of third; media forking at cross vein, the base of posterior branch indistinct; cubitus forking slightly distad of the cross vein.

Male.—Similar to the female in color. Plumæ of antennæ golden yellow, joints eleven to fifteen with short white hairs. Thoracic pruinescence very sparse.

Eyes narrowly separated; length of antenna about twice that of head and thorax combined. Bristles on posterior half of thorax stronger than in female. Hypopygium large, basal portion of lateral arm much swollen and nearly twice as long as the small clawlike apical portion. Legs more distinctly setulose than those of the female, all the tibiæ with series of distinct setulæ; tarsi as in female; claws equal, simple. Venation as in female. Length, 1.75–2.5 mm.

Type locality: Monticello, Ill., June 21–28, 1914 (J. R. Malloch).

The spines on mid femora are often difficult to see and for this reason I have inserted this species in the sections of table dealing with species "with" and also "without" spines.

A NEW SPECIES OF ARTHROMACRA WITH NOTES ON OTHER SPECIES OF LAGRIIDÆ.

BY CHARLES W. LENG,
WEST NEW BRIGHTON, N. Y.

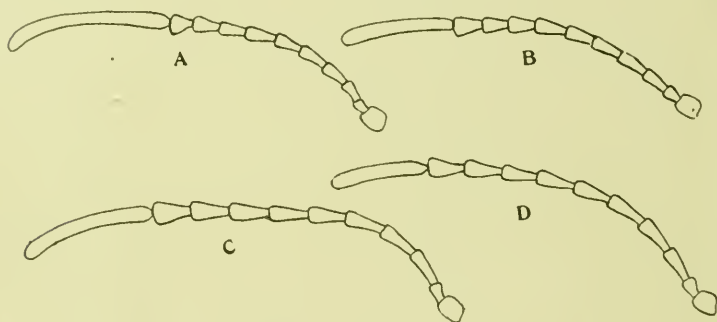
Col. Wirt Robinson has collected in Nelson Co., Virginia, a considerable number of a species of *Arthromacra* which differs from the previously described species by the vivid green color, the smooth, shining, distantly punctate thorax and especially by the great length of the last joint of the antennæ of the male. This species should be dedicated to him in recognition of the work he has done, though busy

with many other occupations, in making known the Coleoptera of West Point and Virginia, and may be described as follows:

***Arthromacra robinsoni* new species.**

Vivid green above, dark cupreous beneath; pronotum smooth, shining, distantly punctate; antennæ, mouth parts, tibiæ and tarsi fuscous; the antennal joints, except the tenth, scarcely serrate, the eleventh joint very long in the male, 2.12 mm. in actual length, much longer than in *A. ænea*, and equal to at least six preceding joints combined, shorter in the female, equal to about four preceding joints. A little smaller, but otherwise similar to *A. ænea*, the elytra similarly rugosely punctate with faint indications of longitudinal costæ, and the tarsi similarly hairy beneath. Length, male, 8.0-8.5 mm.; female, 11 mm.

Occurs in Nelson Co., Va. Type male and female in my collection.



A. (male) B. (female) antennæ of *A. robinsoni*.
C. (male) D. (female) antennæ of *A. ænea*.

The proportions of the antennal joints are shown in the drawings, herewith reproduced, of Mr. C. E. Olsen. He detached the antennæ from the specimens and mounted them on slides, so that they could be drawn with the precise accuracy of microscopic measurements.

In *A. robinsoni*, being a smaller insect, the entire antenna is shorter than in *A. ænea*; but in both sexes the last joint is actually longer, and proportionately very much longer, as shown by the figures and measurements of Mr. Olsen, viz.:

<i>A. robinsoni</i> , male,	entire antenna = 5.25 mm., last joint = 2.12 mm.
<i>A. robinsoni</i> , female,	entire antenna = 4.75 mm., last joint = 1.5 mm.
<i>A. ænea</i> , male,	entire antenna = 6.00 mm., last joint = 1.75 mm.
<i>A. ænea</i> , female,	entire antenna = 5.50 mm., last joint = 1.3 mm.

In *A. robinsoni* the last joint of the male equals at least six preceding joints, the last joint of the female about four; in *ænea* the last

joint of the male equals about three and one third preceding joints, the last joint of the female about two and three quarters preceding joints.

The following details of the capture of this species have been supplied by Col. Robinson. "While collecting beetles near my home in Nelson County, Virginia, in the latter part of June, 1911, I noticed in the wood road that I was following numerous droppings of toads and, in all of these, brilliant golden green elytra of a beetle unknown to me. On June 30 I took one of these beetles crawling over dead leaves on the road side. On June 30, 1913, I went to the same locality with the hope of taking others but for some hours my search was unavailing. I finally came to a small opening in the woods where the timber had been cut down several years before and shoots, mainly of oak, had sprouted up around the stumps and reached a height of eight or ten feet. The clumps of these sprouts were very thick. At almost the first stroke of my beating stick there poured into my umbrella a shower of golden green beetles. In a few minutes I took over sixty. They were mating and I took many pairs in copulation. When fresh, the males are brilliant green, the females a red gold with greenish tinge; but after a while the females change to green like the males. To clinch my conclusion that I had a new species, the common form (*A. anea*) was taken abundantly with the green one and the sexes were also mating; but in no case was there any pairing between individuals of different color."

This species has been compared with *A. glabricollis* Blatchley, of which the types were kindly loaned by the author; and no close resemblance was found. The antennæ in *A. glabricollis* are similar to those of *A. anea*, the last joint being as long in the male as the three or four preceding joints combined. The thorax of *A. glabricollis* is also different from that of *A. robinsoni*, for while smooth as compared with that of *A. anea*, the tendency to form transverse rugæ is still traceable, though reduced to a minimum, while that of *A. robinsoni* is absolutely smooth and shining, interrupted only by the distant punctuation. That *A. anea* is variable in the degree of thoracic sculpture is well shown in a specimen I collected in the mountains of northern Georgia, in which the thorax is strongly transversely rugose, being in that respect exactly opposite to *A. glabricollis*, as well as the largest and most southern example known to me. This may be known as *anea* var. *rugosecollis*. It is possible that *A. glabricollis* should

also be entitled to somewhat less than specific rank, since in this genus, as in *Statira*, specific difference seems to be indicated by a difference in relative length of antennal joints rather than sculpture.

Comparison has also been made with the original descriptions of Say's *aneca* and Kirby's *donacioides*, and with specimens, kindly sent by Mr. J. I. Beaulne, of Ottawa, of the latter. The Canadian specimens agree in every respect with those from the Atlantic States (of which the collection of Mr. Wm. T. Davis contains a long series) and with Kirby's description, based upon specimens from Lake St. Clair (between Michigan and Ontario) and Massachusetts. They do not however agree with Say's description of *A. aneca*, either in color or locality for he describes an insect that is "green, sometimes tinged with brassy" of which a specimen was obtained on "Red River" in the course of an expedition to the source of St. Peter's River. This would now be in North Dakota or northern Minnesota. I have been unable to obtain any specimens from Say's type locality; if any can later be examined, it is possible that they may not prove identical with Kirby's species; a possibility that becomes even a probability in view of the variations already made known and the discrepancies in the descriptions.

It seems also advisable to point out that the statement in Leconte and Horn's Classification that all our species of Lagriidæ belong to the tribe Statirinae requires correction as mentioned by Champion (Biol. Cent.-Am. Col., IV, 2, p. 4). Seidlitz (Ins. Deutschl., V, 2, 1898) groups the species into three tribes, viz.: Trachelosteninae, Lagriinae and Statirinae. The first comprises only six South American species, the second includes *Arthromacra* and other genera of palaearctic origin, the third includes *Statira* and other genera of tropical origin; and it is interesting to note that while *Arthromacra* occurs only in our northern region, *Statira* is represented by two species in the Antilles and in our southern states by thirteen species of which two reach as far north as Pennsylvania and New York. Many of the species of *Statira* have become known through Mr. Schaeffer's work in Arizona and Brownsville, Texas. Both genera occur in the vicinity of New York City, one coming down to us from the north, the other up from the south.

I have not found any American reference to the food habits of any species of Lagriidæ; the European *Lagria hirta*, the first species of the family to be described, has been repeatedly redescribed in all

its stages, the references in the Junk Catalogus covering two entire pages. The larva, fide Lyonet (Rech. s. l'anat., 1832, p. 112), feeds on the dead leaves, in which adult larvæ have been found in May; but Perris (Mem. Soc. Sc., Liege, 1855, p. 255), thought this view contestable on account of the affinities observed with larvæ of Silphidæ and Dermestidæ and suggested that the food was more probably dead or living animal matter, hidden in the leaves.

As the list of our species of Lagriidæ contained in Junk Catalogue, 1910, is greatly increased, a list of the species now known is added.

Family **LAGRIIDÆ**.

Tribe *Lagriini*.

Genus **Arthromacra** Kirby.

A. ænea Say. Red River.

Say, Lang's Exped., II, 1824, p. 287; Horn, Trans. Am. Ent. Soc., XV, 1888, p. 28; Blatchley, Beetles of Indiana, 1910, p. 1284.

?*donacioides* Kirby, Fauna Bor. Am., IV, 1837, p. 239. N. E. America.

var. *glabricollis* Blatchley. Indiana.

Blatchley, Beetles of Indiana, 1910, p. 1285, fig. 370.

var. *rugosecollis* Leng n. var. Georgia.

A. robinsoni Leng n. sp. Virginia.

Tribe *Statirini*.

Genus **Statira** Serville.

Synopsis: Schaeffer, Journ. N. Y. Ent. Soc., XIII, 1905, p. 179.

S. basalis Horn. Southern United States.

Horn, Trans. Am. Ent. Soc., XV, 1888, p. 31.

S. croceicollis Mäklin. Southern United States.

Mäklin, Mex. Art. Act. Soc. Fenn., 1863, p. 594; Horn, *l. c.*, p. 30.

S. gagatina Melsheimer. Northern United States.

Melsheimer, Proc. Acad. Phil., II, 1846, p. 311; Horn, *l. c.*, p. 31.

Blatchley, Beetles of Indiana, 1910, p. 1285.

S. opacicollis Horn. Arizona.

Horn, *l. c.*, 1888, p. 30.

S. resplendens Melsheimer. Pennsylvania.

Melsheimer, *l. c.*, 1846, p. 311; Horn, *l. c.*, p. 30; Blatchley, *l. c.*, 1285.

S. robusta Schaeffer. Texas.

Schaeffer, Journ. N. Y. Ent. Soc., 1905, p. 180.

S. subnitida Leconte. Lower California.

Leconte, New Spec. Col., 1866, p. 141; Horn, *l. c.*, p. 29.

S. colorata Fall. Lower California.

Fall, Can. Ent., 1909, p. 165.

S. pluripunctata Horn. Arizona.

Horn, *l. c.*, 1888, p. 29; Champion, Biol. Cent. Am. Col., IV, 2, p. 52.

S. simulans Schaeffer. Texas.

Schaeffer, *l. c.*, XIII, 1905, p. 180.

S. huachucae Schaeffer. Arizona.

Schaeffer, *Sci. Bull. Brookl. Inst. Mus.*, I, 1905, p. 176.

S. defecta Schaeffer. Arizona.

Schaeffer, *l. c.*, p. 175.

S. pulchella Mäklin. Mexico, Texas.

Mäklin, *l. c.*, p. 589; Champion, *l. c.*, p. 32, pl. 2, fig. 8; Schaeffer, *Journ. N. Y. Ent. Soc.*, XIII, 1905, p. 180.

There are many Mexican species of *Statira*, which are not included in this list.

A SHORT REVIEW OF THE NORTH AMERICAN SPECIES OF ONTHOPHAGUS (COL. SCARAB.).

BY CHARLES SCHAEFFER,

BROOKLYN, N. Y.

The addition of three more species of *Onthophagus* to our fauna besides those species made known since Dr. Horn published his paper¹ on the North American species of this genus make it advisable to give an account of all our species. Dr. Horn enumerated five species in the paper mentioned above with three varieties of *janus*. Two of these varieties, *subaeneus* and *orpheus*, are restored to specific standing as they are in no way connected with each other. The armature of the head and prothorax of the males of certain Scarabæidæ differ very much individually and are greatly reduced in the smaller and feebler males which resemble then more or less the females, but, as a rule, either the reduction or the stronger development of the armature affects the head and prothorax alike in the same species and never is one part more developed or reduced than the other.

The males of those species of which the two sexes do not differ from each other in the form of prothorax are said to be known only by their more slender anterior tibiæ and smoother head. This is true, but the difference, especially in the anterior tibiæ, is not so striking in our species. However, a better character of distinguishing the two sexes, which I do not find mentioned anywhere, is the form of the

¹ Trans. Am. Ent. Soc., Vol. V, p. 137.

last abdominal segment. This segment is at middle broadly arcuately emarginate in the male and is therefore much narrower at middle than at sides, while the female has the last abdominal segment not emarginate at middle and of equal or very nearly equal width throughout.

O. brevifrons Horn, which I do not know, is not included in the following table, but the description is given at the end of the notes and remarks which follow the table.

TABLE OF THE SPECIES OF ONTHOPHAGUS.

- | | |
|---|--------------------|
| 1. Thorax and elytra uniformly black, shining | 2 |
| Thorax and elytra either variable in color or when black, never shining | 3 |
| 2. Large species, 10-13 mm., upper cephalic carina of male prolonged into a moderate long horn or acute tubercle on each side, lower carina absent; clypeus different in the two sexes, broad, sides almost straight, anteriorly reflexed and anterior margin truncate at middle in the male; narrower with sides oblique and anterior margin emarginate in the female | <i>coproides</i> . |
| Smaller species, 6-6.5 mm., upper cephalic carina of male obliterated at middle but on each side visible as a short elevated line; clypeus alike in the two sexes, anterior margin truncate | <i>polyphemi</i> . |
| 3. Prothorax on disk and at sides distinctly granulate ¹ | 4 |
| Prothorax not granulate but punctate, at least on disk ² | 7 |
| 4. Prothorax shining, metallic green; elytra more or less dark metallic green with base and sometimes apex testaceous; the head of the male has the upper carina produced on each side into a slender horn, prothorax produced at middle into a broad process, which is arcuately emarginate at apex | <i>subaneus</i> . |
| Prothorax dull | 5 |
| 5. Clypeus emarginate at apex, color brownish black, head of male with two, rather closely placed, erect horns, lower carina absent. Prothorax scarcely produced at middle, the granules less numerous and smaller than in <i>hecate</i> | <i>velutinus</i> . |
| Clypeus not emarginate at apex, either truncate, rounded or more or less produced at middle | 6 |
| 6. Uniformly dark or brownish black, elytra in some western specimens at apex and sides with one or more small testaceous spots; second and following intervals with a confused triseriate punctuation; upper cephalic carina in male feeble or absent, lower carina distinct; prothoracic process elongate and feebly emarginate at apex with a more or less distinct bidentate process at middle of emargination... | <i>hecate</i> . |

¹ The granules are very distinct in *subaneus*, *hecate* and *guatemalensis*, but are finer and rather more sparsely placed in *velutinus*.

² In a few species the thorax at apex at sides and middle has some more or less distinct granules, which, however, do not extend to the disk and base where the thorax is plainly punctured.

Uniformly bluish or greenish, second and following intervals more or less distinctly biserially punctate; prothoracic process of male similar to small male *hecate*, upper cephalic carina produced on each side into a more or less distinct, acute tubercle, lower carina distinct.

guatemalensis.

7. Clypeus at apex truncate or rounded 8
Clypeus at apex distinctly emarginate¹..... 11
8. Prothorax and elytra uniformly metallic green or coppery, shining; prothoracic protuberance in male prolonged on each side; fully developed males have on each side of head a short acute elevation, less developed males a short, oblique, elevated line.....*orpheus*.
Prothorax and elytra not uniformly metallic green or coppery..... 9
9. Base of prothorax with a distinctly elevated, narrow margin. Prothorax metallic green or coppery, shining; elytra testaceous with suture and some irregular spots green or blackish green; underside black, with metallic reflection. Male with two feeble tubercle-like elevation on vertex and a short lobe-like prothoracic protuberance....*arizonensis*.
Base of prothorax without distinctly elevated narrow margin..... 10
10. Prothorax shining, with æneous or cupreous tint; elytra uniformly piceous with feeble æneous tint (*janus*); or piceous with base and sometimes apex also more or less testaceous (*substriatus*). Fully developed males with two elongate cephalic horns, prothorax broadly but feebly produced at middle*janus*.
Prothorax and elytra dull, black or brownish black; males without any cephalic or prothoracic protuberance or horns.....*pennsylvanicus*.
11. Prothorax at base margined with a narrow, elevated line..... 12
Prothorax at base without narrow elevated line..... 13
12. Prothorax and elytra cupreous, shining, male without cephalic or prothoracic protuberance*cribricollis*.
Prothorax black or brownish black, convex and declivous in front, elytra testaceous with black spots; head of male with a strongly produced upper carina which at middle is prolonged into a narrow horn-like prominence, lower carina absent*nuchicornis*.
- Prothorax and elytra uniformly black or bluish black; head of male without distinct carinæ or horns; prothorax of male produced at middle into a short broad lobe, the lobe at apex rounded, slightly recurved and feebly emarginate at middle*lecontei*.
13. Upper cephalic carina in male and female represented by two more or less distinct tubercles, lower carina feeble or absent; prothorax alike in both sexes; prothorax and elytra brownish black, elytra generally with pale spots*tuberculifrons*.
Male without cephalic carinæ or protuberance, female with the usual upper and lower carinæ; prothorax of male produced at middle into a short, broad, conical lobe, except in *texanus* 14

¹ Feebly emarginate in some specimens of *nuchicornis*.

14. Prothorax and elytra uniformly brownish black, dull*anthracinus*.
 Prothorax æneous or bronze, shining 15
15. Prothorax uniformly æneous or bronze, shining; elytra piceous, with more or less distinct yellow spots, surface with a somewhat greasy appearance; prothorax of male produced anteriorly into a short, conical lobe; anterior tibiæ elongate with a pencil of hairs in the apical emargination*landolti*.
 Prothorax shining, bronze or æneous at middle, at sides more or less yellowish; elytra brown, dull, with yellow spots more or less longitudinally confluent, forming in some specimens longitudinal vittæ; prothorax alike in the male and the female, unmodified; anterior tibiæ of male scarcely more elongate than in the female and without pencil of hairs in the apical emargination*texanus*.

Onthophagus coproides Horn.

Horn, Trans. Kans. Acad. Sci., Vol. VII, p. 79.

♀*O. cuboidalis* Bates. Biol. Cent. Am. Col., Vol. 11, pt. 2, p. 79.

Our largest species (10–11 mm.); of uniform black color, polished. The clypeus of the male is broad, the sides nearly straight; anterior margin with more or less rounded sides, subtruncate at middle, lower carina present, but feeble; upper carina arcuate, produced laterally on each side into a short horn. Prothorax suddenly declivous in front, at middle broadly, subtriangularly produced; the punctuation is rather strong in front becoming finer and almost obliterated at base, the base with narrow, elevated margin. The elytral intervals are feebly punctate. The female has a smaller clypeus with oblique sides and emarginate anterior margin; the carinæ are stronger than in the male, the posterior one is somewhat depressed at middle.

The description of the Mexican *O. cuboidalis* agrees with our insect very closely and is possibly the same.

Onthophagus polyphemi Hubbard.

Hubbard, Insect Life, Vol. VI, p. 311.

This species is of the size of *O. orpheus* found in the holes of the gopher (*Gopherus polyphemus*) in Florida and is one of the remarkable discoveries of the lamented H. G. Hubbard. The color is uniform black, shining. The clypeus is arcuate and feebly truncate in front; in the male the lower carina is distinct and the upper carina more or less obsolete at middle or sometimes reduced to a pair of tubercles; the prothorax is convex, rather suddenly declivous in front

but not produced at middle. The female has the two carinæ distinct as usual, and a less convex prothorax than the male without declivity in front. The intervals of the elytra are distinctly biserially punctate. The anterior tibiæ are alike in both sexes. Less developed males are hardly distinguishable from the females, except by the different form of the last abdominal segment.

***Onthophagus subæneus* Beauvais.**

Beauv., Ins. Afr. et Am., p. 105, tab. 3, fig. 9.

Horn, Trans. Am. Ent. Soc., V, p. 139.

Blatchley, Col. of Ind., p. 919.

This is a good species and not a variety of *janus*. It is more closely related in form, sculpture and armature of prothorax to *hecate* than to any other of our North American species. The color is metallic green, base and apex of elytra and sometimes the pygidium more or less yellowish. The head has the clypeus with a similar process as *hecate*; in the male the upper carina is weak at middle, but produced on each side into a more or less prominent, acute tubercle, or small horn, the prothorax is granulate, produced at middle nearly as in *hecate*, but the process is generally broader at apex and without any bidentate process within the apical emargination.

The female has the prothorax anteriorly produced into a very short, broad protuberance.

***Onthophagus velutinus* Horn.**

Horn, Trans. Am. Ent. Sci., Vol. V, p. 140.

This is a smaller and slightly more elongate species than *hecate* of uniform black or brownish black color, the prothorax rather sparsely and more finely granulate than in *hecate*, the clypeus emarginate and the posterior carina of the head of the male small and produced into two moderately long slender horns. The female is unknown to me. It occurs in Lower California and Arizona.

***Onthophagus hecate* Panz.**

Panz., Faun. Bor. Am. Prodr., 1794, p. 5.

Horn, Trans. Am. Ent. Soc., Vol. V, p. 138.

Blatchley, Col. of Ind., p. 918.

A common, well-known eastern species which is found as far south as Florida and extends west to Texas and Kansas.

The color is uniformly dull black or brownish black, the elytra in some specimens from Kansas and Texas have a very few pale spots at sides and apex; the prothorax is granulated and the intervals of the elytra finely so.

The apex of the clypeus is prolonged into a more or less prominent subtriangular process; the male has the upper carina very faint or absent, the lower present; prothorax produced at middle into a rather broad, elongate process which is anteriorly emarginate with a small bidentate process at middle of emargination. The prothorax of the female is anteriorly less convex than in the male and has a short, broad protuberance which is truncate in front.

***Onthophagus guatemalensis* Bates.**

Biol. Cent. Am. Col., Vol. II, pl. 2, p. 73, tab. V, figs. 16 and 16a.

Though described and known only from such remote localities as British Honduras and Guatemala specimens in my collection from New Braunfels, Texas agree so closely with the description that I am compelled to refer these to *O. guatemalensis*. This species is very much like *O. hecate* in form and sculpture of prothorax and elytra, but the color is always distinctly bluish green, and in the more developed males the upper cephalic carina is on each side acutely produced; the prothorax is not as closely granulate as in *hecate*, the median lobe, in fully developed males, is strongly produced and furcate, nearly as in *orpheus*, in less developed males the prothoracic and cephalic prominences are nearly as in *hecate*; the intervals of the elytra are biserially punctate or rather granulate. In the female the prothorax and head are as in *hecate* except that the upper cephalic carina in *guatemalensis* is sinuate, in *hecate* straight.

***Onthophagus orpheus* Panz.**

Panz., Faun. Bor. Am. Prodr., p. 5, tab. 1, fig. 2.

Horn, Trans. Am. Ent. Soc., Vol. V, p. 139.

Blatchley, Col. of Ind., p. 919.

This is not a variety of *janus* but a distinct species as there is no connecting link between the two, the cephalic and prothoracic processes of the males are entirely different and never approach each other, and the color is always metallic green or bronze, shining.

The head of the male has the anterior carina feeble at middle, on each side elevated into an acute tubercle; the prothoracic process is

elongate, broad and very deeply, arcuately emarginate at middle. The larger females have a short, broad and anteriorly truncate protuberance at middle of prothorax in front.

In the neighborhood of New York this species is taken occasionally at the Palisades and commonly at West Point by Col. Robinson. Specimens from Wisconsin and Montana in my collection indicate a wide distribution.

***Onthophagus arizonensis* Schaeffer.**

Schaeff., Sci. Bull. Brookl. Inst. Mus., Vol. I, p. 382.

This species was collected by F. W. Nunnenmacher in Nogales, Arizona.

Metallic green with more or less cupreous tint on head and prothorax, elytra pale with suture and a number of variable spots metallic green, the spots more or less longitudinally and transversely confluent. The clypeus is truncate at apex. The head of the male has the upper carina represented by two feeble tubercles, the lower carina is absent. The prothorax of the male is produced at middle into a short cone-like projection.

***Onthophagus janus* Panz.**

Panz., Faun. Bor. Am. Prodr., 1794, p. 5, tab. 1, fig. 3.

Horn, Trans. Am. Ent. Soc., Vol. V, p. 139.

Blatchley, Col. of Ind., p. 919.

***Onthophagus striatulus* Beauv.**

Beauv., Ins. Afr. et Am., p. 92, tab. 3, fig. 5.

Horn, Trans. Am. Ent. Soc., Vol. V, p. 139.

Blatchley, Col. of Ind., p. 919.

This well-known species is widely distributed in the Eastern United States.

Head and prothorax metallic green or bronze, shining; elytra less shining than the prothorax, uniformly piceous with more or less cupreous reflection (*janus*) or piceous with base and apex more or less pale (*striatulus*). Head of male with clypeus anteriorly rounded, lower carina absent, upper carina feeble and on each side produced into an acute tubercle or slender horn. Prothorax produced at middle into a very short, broad projection.

Both forms *janus* and *striatulus* occur together and are connected by intermediate forms.

Onthophagus pennsylvanicus Harold.

Harold, Coleopterologische Hefte, Vol. VIII, p. 115.

Horn, Trans. Am. Ent. Soc., Vol. V, p. 141.

Blatchley, Col. of Ind., p. 920.

Our most common and well known eastern species which is found as far south as Florida and from there extends to Texas and Kansas. The color is generally brownish black, with a faint metallic tint on the prothorax. The prothorax is alike in both sexes, not modified in the male. The clypeus is arcuate-truncate in front. The male has the head without carinæ, in some specimens, however, the upper carina is faintly indicated. In the female the upper carina is generally very faintly indicated and the lower distinct; in very small females both carinæ are often obsolete or even absent. The front tibiæ are slightly more elongate in the male than in the female.

Onthophagus cribricollis Horn.

Horn, Trans. Kans. Acad., Vol. VII, p. 76

Blatchley, Col. of Ind., p. 920.

This species is described from Kansas and Texas and is reported from Indiana but seems to be very rare in collections. I was unable to secure any specimens from the typical localities but two female specimens in my possession, one from Lakehurst, N. J. and one from Long Island (Yaphank), N. Y., agree in every respect with the description of this species. They look at first sight like very small *O. orpheus* but the elytra are a little less shining, the prothorax is relatively more coarsely punctate and is distinctly margined at base and the clypeus is rather deeply, triangularly emarginate; the color is dark bronze. The head of the male is described as unarmed and the prothorax not modified.

This species is perhaps not as rare as it seems and may be overlooked on account of its great resemblance to very small *O. orpheus*.

Onthophagus nuchicornis Linn.

Linn., Syst. Nat., I, 2, p. 547.

Melsh., Proc. Acad. Nat. Sci. Phil., Vol. II, p. 134 (*O. rhinoceros*).

An introduced European species, which is frequently taken in New Jersey and New York (Long Island).

It is one of the larger species and is black or brownish black, dull, elytra pale, sprinkled with a variable number of darker spots. The

clypeus is rather feebly emarginate, the posterior carina of the head of the male is produced into a short, broad plate, from the middle of which arises a narrow horn, the lower carina is absent; the prothorax is rather convex and declivous in front without projections. The female has the head with the usual two carinae and the prothorax is less convex than in the male and in fully developed specimens there is at middle a short, broad projection.

***Onthophagus lecontei* Harold.**

Harold, Col. Heft., Vol. III, p. 115.

Bates, Biol. Cent. Am. Col. Vol. II, pt. 2, p. 73.

I have a few specimens from Prescott, Ariz., received from Mr. George Franck, which are referable to this Mexican species. The color is black, opaque, surface sparsely clothed with short, stout, fuscous hairs; clypeus at apex reflexed and rather deeply emarginate at middle. Prothorax strongly but not densely punctate, subasperate near apex. The elytra have the striae feebly impressed and punctate, the intervals with two more or less regular rows of punctures. The males have the upper carina of the head feeble the lower is absent. The prothorax in the male is lobed at middle, the lobe short and broad, rotundate-truncate and slightly reflexed at apex and emarginate at middle. The anterior tibiae of the male are elongate and slightly curved at apex. Length 4.5-5 mm.

***Onthophagus tuberculifrons* Harold.**

Harold, Coleopterologische Hefte, Vol. VIII, p. 115.

Horn, Trans. Am. Ent. Soc., Vol. V, p. 140.

Blatchley, Col. of Ind., p. 919.

This species occurs in the pine region of Long Island and New Jersey and extends as far south as Florida.

Dull brownish-black, elytra with a variable number of pale spots, which are rarely absent. The clypeus is emarginate at apex; the head has the vertex bituberculate in both sexes, the lower carina is more feeble in the male than in the female; the prothorax is unmodified and alike in male and female.

***Onthophagus anthracinus* Harold.**

Harold, Coleopterologische Hefte, Vol. XI, p. 104.

Bates, Biol. Cent. Am. Col., Vol. II, pt. 2, p. 77.

Schaeffer, Sci. Bull. Brookl. Inst. Mus., Vol. I, p. 15.

I have taken this Mexican species in Brownsville, Texas and

Huachuca, Mts., Arizona, and have specimens from Nogales, Arizona, collected by F. W. Nunnenmacher. It is a little larger than *tuberculifrons*, of dull, uniform, brownish color with very feeble bronze lustre. The clypeus is more or less reflexed at apex and anteriorly emarginate. The head of the male has no carinae nor horns or tubercles. The prothorax of the male is produced at middle into a short cone-like projection which is indicated more or less in the prothorax of the female. The anterior tibiae of the male are much elongated and have at apex within the emargination a pencil of stiff, long hairs.

***Onthophagus landolti* Harold.**

Harold, Stett. Ent. Zeitung, 1880, p. 34.

Bates, Biol. Cent. Am. Col., Vol. II, pt. 2, p. 75, tab. V, figs. 21 and 21a.

Schaeffer, Sci. Bull. Brookl. Inst. Mus., Vol. I, p. 158.

Originally described from Colombia and Venezuela this species extends its range as far north as Texas (Brownsville).

Head, prothorax, metasternum and legs metallic green, shining, except the head, which is dull; elytra and abdomen with very faint bluish or rarely greenish tint, the former generally with a variable number of small, reddish-yellow spots from base to apex, rarely without spots. The head in the male is very sparsely punctate, the lower carina is absent and the upper carina is represented on each side by a small, rather feeble, arcuate ridge. The prothorax is rather coarsely, but sparsely punctate, slightly declivous in front and at middle produced into a very short lobe. The elytra are alutaceous with a somewhat greasy appearance, and the intervals are feebly and finely punctate. The anterior tibiae of the male are greatly elongated and have within the apical emargination a pencil of stiff hairs, the anterior tibiae are normal in the female and the head has the usual two carinae. It is smaller than *O. janus*.

***Onthophagus texanus* new species.**

A few specimens which I have taken in Brownsville, Texas, together with *O. landolti* differ from that species in having the prothorax more or less yellowish at sides, the elytra dull, brown, with the yellow spots forming more or less distinct longitudinal vittae; prothorax of the male without anterior modification, the anterior tibiae scarcely differ from those of the female and are without the pencil of hairs at the apical emargination.

Judging from Bates' remarks in the *Biologia* *O. landolti* is a variable species in Mexico and Central America and it is possible that the above described form is only a color variation of *landolti*. However, my material shows no intermediate forms and the specimens are either referable to *landolti* or *texasus*.

***Onthophagus brevifrons* Horn.**

Horn, Trans. Kans. Acad. Sci., Vol. VII, p. 76.

"Oval, slightly oblong, robust, convex. Head and thorax more shining, varying in color from bluish to violet or greenish metallic. Clypeus short and broad, very obtuse in front, the margin broadly reflexed, surface coarsely not densely punctured, suture indistinct. Front more densely and finely punctured. Vertex with a feebly elevated, transverse, sinuous ridge. Thorax very little wider than the elytra, anteriorly retuse, and concave at the sides, surface coarsely but sparsely punctured, with finer punctures intermixed, more densely punctured at the middle of the protuberance. Elytra broader than long, finely seven striate, the striæ obsoletely, distantly punctulate, the outer striæ arcuate, intervals flat, irregularly biserially punctulate, each puncture with a short, erect hair; surface opaque, finely granulate, and with slight purple lustre. Body beneath sparsely punctate, abdomen with few finer punctures at the sides. Anterior tibiæ quadridentate, the upper tooth smaller. Length, .40 inch; 10 mm. Kansas, Texas."

"This species resembles *janus*, but is larger, more elongate, thorax more retuse in front and with a differently formed clypeus and cephalic ornamentation."

NEW SPECIES OF PSAMMOCHARIDÆ.

BY NATHAN BANKS,

WASHINGTON, D. C.

The new species here described belong mostly to two of the larger genera of the family, genera in which there are still numerous novelties yet to be collected in our country, particularly in the western parts.

POMPILOIDES.

This genus can be divided into two sections or subgenera; the typical one includes *P. cylindricus*; the pronotum in this section is angulate behind (except in *P. subviolaceus*), the third joint of antennæ in the female is plainly longer than the fourth joint, and there is no distinct comb to the front tarsi. The other section, which may be called *Nanopompilus*, since it includes *N. argenteus*, has the pronotum arcuate or nearly straight behind; the female has a very distinct comb on the front tarsi, and the third joint of the antennæ is no longer than the fourth. This section includes *argenteus*, *con-similis*, *hyacinthinus*, *minusculeus*, *padrinus*, and *parvus*, and of those with red on the abdomen, *rufibasis*, *autumnalis*, and *pretiosa*.

Pompiloides autumnalis new species.

Female.—Black, with basal half of abdomen red, and pronotum with a silvery hind margin. Clypeus truncate in front; front with long hair; vertex straight across, hairy; antennæ slender, third joint about three fourths of the vertex width, no long hair on basal joint beneath; posterior ocelli slightly nearer to eyes than to each other; pronotum broadly arcuate behind, posterior margin, except a median spot, with silvery pubescence, pronotum above with long hairs; metanotum short, rounded, with silvery pile, most noticeable on the sides, no long hair above, with a median line; abdomen red on first, second and most of third segments above, below red on the first and second segments, apical and ventral segments with long hairs. Legs slender, black, a few hairs under middle of femur I, all strongly spined, inner spur of hind tibia more than one half of metatarsus. Wings smoky, apex darker, third cell subtriangular, shorter than the second, receiving the second recurrent vein a little beyond the middle, basal vein interstitial with the transverse. Length, 10 to 12 mm.

From Ridgeway, Ontario, Canada, Sept. (Van Duzee), and Chicago, Ill., Sept. (Brues).

Differs from *P. semirufus* in white-margined pronotum, in long hair on pronotum, and longer hair on front, and strong comb on anterior tarsi.

Pompiloides autumnalis var. *atlanticus* new variety.

This variety has been taken by Mr. Howard Shannon at Long Beach, L. I., in August and September on the sea beach. As far as I can see it does not differ much in structure from the typical form, but the pronotum is entirely black, no trace of the white posterior border, the wings are darker in all the

specimens seen. The posterior margin of the pronotum is a little more angulate than in the typical form. The comb on tarsus I is of the same long, broad spines, the vertex straight across, the abdomen with two segments below and two and a half above reddish, and the body (except propodeum) hairy as in the typical form.

***Pompiloides reducta* new species.**

Related to *P. marginatus*, but antennæ shorter, and the vertex broader. Female.—Black; head, especially the clypeus with dull tawny pile, very few hairs except on orbits, pro and mesonotum also show tawny pile, second segment of abdomen mostly or wholly reddish above, tarsi dark brown; wings blackish, nearly evenly colored throughout, hind wings dusky. Clypeus truncate on margin, face scarcely narrowed above, vertex nearly straight across, posterior ocelli plainly nearer to eyes than to each other; antennæ with third joint plainly a little longer than the fourth, the second and third together do not equal vertex width; pronotum slightly angulate behind, metanotum with a faint median line; abdomen rather shorter than in *P. marginatus*, apical and ventral segments with long hairs; tarsus I without distinct comb, the spines hardly as long as width of the joint; inner spur of the hind tibiæ about two thirds as long as the metatarsus. Wings with the venation similar to that of *P. marginatus*, but the second discoidal cell is hardly as long as in that species. Length, 8 mm.

From Falls Church and Glencarlyn, Va., and Ridgeway, Ontario, Canada (Van Duzee), latter part of June to early August.

***Pompiloides stenotus* new species.**

Black, rather shining, with silvery sheen, very distinct on face, pleuræ, coxæ, and metanotum. Clypeus truncate on margin, vertex scarcely rounded, posterior ocelli hardly nearer to eyes than to each other; pronotum angulate behind; metanotum with faint line in middle, abdomen very slender, no prominent hairs below, last dorsal segment with a pair of tufts of short hair near the middle of hind margin; legs slender, with very few, short spines, hind tibiæ with only three in row above, the inner spur about two thirds as long as the metatarsus. Wings blackish at tip, but nearly hyaline elsewhere, third submarginal petiolate, receiving the second recurrent beyond the middle. Length, 7 mm.

From Bradentown, Florida, March (Van Duzee).

***Pompiloides clystera* new species.**

Male.—Similar to *P. cylindricus*. Deep black, but not silvery. Under each antenna, above base of clypeus, there is a patch of tawny brown hair each side; clypeus truncate on margin; head narrow, posterior ocelli plainly a little nearer to the eyes than to each other, vertex slightly, evenly rounded, occiput with black hairs, antennæ plainly heavier than *P. cylindricus*; pro-

notum plainly angulate behind; metanotum with median line above and excavate behind; abdomen slender, no distinct hairs on venter; legs slender, hind tibiæ with five spines above in a row, none near as long as width of the joint, inner spur nearly two thirds of metatarsus. Wings deep black throughout, third submarginal cell slightly petiolate, receiving the second recurrent vein at about middle. Length, 10 mm.

From Stanford Univ., Calif. (Doane).

Pompiloides solonus new species.

Female.—Deep blue black; clypeus broad, truncate in front, face narrowed above, posterior ocelli plainly closer to eyes than to each other, vertex straight across, antennæ long and slender, third joint about as long as vertex width, occiput with black hair; pronotum angulate behind; metathorax with impressed line; no row of hairs on basal ventral segments of abdomen; legs rather stout, hind tibiæ with five spines in row above, spines on tarsus I not twice the width of the joints. Wings deep blue black, third submarginal cell as long above as the second, receiving the second recurrent vein at the middle. Length, 10 mm.

From Garces, Arizona, August (Biedermann).

Pompiloides estellina new species.

Male.—Jet black; face below and at sides of the antennæ silvery, some silvery pubescence on the thorax, especially on posterior part of the metanotum; abdomen deep black; wings blackish, tip darker. Clypeus truncate below, face a little narrowed above, posterior ocelli slightly nearer the eyes than to each other, vertex nearly straight across, a number of long black hairs on the face and vertex; pronotum angulate behind, with a few long hairs above; metanotum short, with an impressed median line; abdomen slender, depressed, sessile, no hairs on the venter; spines on legs short, inner spur of the hind tibiæ a little more than one half as long as the metatarsus. Wings with marginal cell very short, second obliquely quadrate, third cell small, petiolate, receiving the second recurrent vein at the middle, second discoidal cell short, but not twice its length from the outer margin.

Female.—Similar to the male, abdomen broader; third joint of the antennæ plainly longer than the fourth; anterior tarsi without distinct comb, the spines straight and no longer than width of a joint. Length, male 8 mm., female 9 mm.

From National City, Calif., 15 May (Van Duzee). Related to *P. angularis*, but in that species the second discoidal cell is still shorter and fully twice its length from the outer margin of the wing.

Pompiloides rectus new species.

Black, with silvery pubescence, distinct on the face and thorax, especially each side at the tip of the metanotum. Clypeus truncate in front, antennæ

moderately heavy, posterior ocelli as near each other as to the eyes, vertex barely rounded, head with many black hairs; pronotum angulate behind; metanotum low and rather short, with a median line; abdomen slender, scarcely depressed above, with a few barely visible hairs below; legs with weaker bristles than in *P. cylindricus*, inner spur of hind tibiae about three fourths of the metatarsus. Wings hyaline, tip black, marginal cell very short, second and third submarginal cells also short, each higher than broad, the vein between them vertical, the third cell narrowed above, receiving the second recurrent vein at the middle, basal vein interstitial with the transverse.

Female.—Similar, but hardly silvery, the third joint of the antennae about three fourths of vertex width; inner spur of hind tibiae not three fourths of metatarsus; no comb on tarsus I; wings nearly uniform blackish, rather paler in the disc, venation as in the male. Length, male 8 to 10 mm., female 10 to 11 mm.

From Great Falls, and Chain Bridge, Va., in June; Ridgeway, Ontario, Can., and East Aurora, N. Y. (Van Duzee); and Black Mt., N. Car., May. Similar to *P. insoleus*, but the cells shorter and the vein between them erect instead of inclined.

***Psammochaeres hirsutifemur* new species.**

Female.—Purplish black; head and thorax rather densely black haired, much hair on clypeus, but no long hair on basal antennal joint, clypeus scarcely convex on margin; antennae short, third joint about one third of vertex width, vertex higher than eyes, nearly straight across, hairy; posterior ocelli little closer to each other than to the eyes; pronotum moderately long, arcuate behind; metanotum short, with median groove, densely long-haired; abdomen with first segment hairy on base, and on apical segments, and a few hairs on the ventral segments; legs moderately slender, with many spines, those on the hind tibiae one half the width of joint, inner spur about two fifths of the metatarsus, all femora densely long black-haired, the front femora hairy above, more hairy than any other species of this section, no comb on the tarsus I, claws with basal acute tooth. Wings deep violaceous black, hind pair hardly as dark, second submarginal about as long as broad, third narrowed at tip, receiving the second recurrent at the middle, this recurrent vein slightly bent outward in the middle, basal cross veins interstitial, veins not reaching margin. Length, 14 mm.

From Lemon Grove, 22 May, and Forster's, San Diego Co., 29 May, Calif. (Van Duzee).

***Planiceps luxus* new species.**

Female.—In general similar to *P. niger*, but blue or green according to light; clypeus with long hairs, truncate on margin, ocelli forming a nearly equilateral triangle, the posterior ones hardly nearer to eyes than to each

other, vertex straight across, antennæ short, third joint not one half of vertex width; pronotum long, straight behind; metanotum with large, median depression behind; the abdomen no longer than thorax, with a few long hairs near tip; legs rather short, with short spines, inner spurs of hind tibiæ one half of the metatarsus, middle coxæ hairy below. Wings deep black, rather paler in discal area, two submarginal cells, the second, which is long, receiving the first recurrent vein at middle, the second recurrent considerably beyond the cell.

Male similar to female, but smaller; wings paler on basal part, the pronotum hardly as long, and more bent down in front, the posterior corners of the metanotum with dense silvery pile nearly reaching across, also a white stripe above on hind coxæ. Length, female 10 mm., male 7 to 8 mm.

From National City, Calif., 15 May (Van Duzee).

***Ageniella norata* new species.**

Male.—Black; head and thorax with silvery pile; abdomen rather shining black, last dorsal segment white. Clypeus slightly rounded below; antennæ long, third joint about two thirds of the vertex width, vertex rounded, with a few long hairs, posterior ocelli much closer to each other than to eyes; pronotum arcuate behind; metanotum long, sloping, no median groove, with dense white pile, especially on the sides; coxæ silvery, rest of legs dull black, tarsi rather brownish, spurs black, but those on leg I pale, inner one of hind tibiæ a little more than one half of the metatarsus; abdomen slender, almost petiolate, with very slight pale pile; wings hyaline, the apex blackish, third submarginal cell quite long, especially below, but above no longer than the second, receiving the second recurrent vein a little beyond middle, basal veins a little before the transverse. Length, 7 mm.

From Niagara Falls, N. Y., July (Van Duzee) and Falls Church, Va., July. Related to *A. petiolatus*.

***Ageniella praestans* new species.**

Slender; black, with silvery pubescence, very distinct on the face below antennæ, on thorax and coxæ, and less distinct on the abdomen. Clypeus rounded below, posterior ocelli hardly nearer each other than to eyes, vertex rather strongly rounded above, but one bristle each side by upper orbit, about as high as the lower ocellus; occiput white haired; pronotum strongly arcuate behind, metanotum long, sloping, with median line; abdomen subpetiolate, all black; legs long and slender, black, spurs black, inner one of hind tibiæ a little more than one half of the metatarsus. Wings faintly dusky, tip much darker, third submarginal cell about as long as the second, both longer than high, third receiving the second recurrent at middle, this recurrent quite strongly curved outward. Length, 6 mm.

From San Diego Co., June (Van Duzee) and Mts. near Claremont (Baker); both California. Differs from *A. euphorbiæ* in lack

of white spot at tip of abdomen, in position of second recurrent, and darker tipped wing.

Ageniella clypeata new species.

Male.—Black, with silvery pubescence, clypeus pale yellowish, vertex slightly rounded, no long hairs, posterior ocelli nearer to eyes than to each other, antennæ rather short; pronotum weakly angulate behind; metanotum low and sloping, with a median smooth line on the basal part, posterior corners with dense white pile; abdomen also sericeous, lower margin of segments pale; legs very long and slender, leg I (including coxæ) pale, other legs dark on femora and tibiæ at least above, hind tarsi darker, spurs white, inner one of hind tibia two thirds of the metatarsus. Wings faintly fumose, tips darker, third cell higher than long, angulate in the middle behind, receiving the second recurrent beyond the middle, this recurrent scarcely curved outward, in both fore wings there is from the juncture of the first recurrent with the second submarginal cell a short projection into the second discoidal cell. Basal veins interstitial. Length, 8.5 mm.

From Chain Bridge, Va., 14 June.

BEES FROM ECUADOR AND PERU.

By T. D. A. COCKERELL,

BOULDER, COLORADO.

On his recent trip to South America, Professor C. T. Brues collected a very interesting series of bees, which are reported on herewith. I have included also a series collected by Mr. v. Buchwald at Guayaquil, transmitted to me by Mr. J. D. Alfken of Bremen, and a few collected by Professor Townsend in Peru.

Comparatively little has been known of the bees of Ecuador and Peru, so it is not surprising that many of the species are new. Reviewing the collection as a whole, the following points are of interest:

1. The species of the coast region of Ecuador and Peru are mostly distinct from those found elsewhere, though the Brazilian fauna is represented by a few unmodified forms, and a few are identical with species of Central America. Probably, as regards species, there are two rather distinct faunæ, that of Ecuador and adjacent parts of

Columbia, and that of Peru. The Ecuador-Columbia coast region is distinctly more humid than that of Peru.

2. There is, so far as the materials before me show, a total absence of precinctive genera: generically the fauna is nearly the same as that of other parts of tropical South America, but it is interesting to find at Guayaquil the characteristic southern genus *Leptometria* meeting the northern (Antilles and Eastern U. S.) *Florilegus*.

3. The peculiar Chilean bee-fauna scarcely invades this region at all, yet a very few species, such as *Megachile ecuadoria*, must be derived from the Chilean group. The southern genus *Lonchopria* gets as far north as Matucana, Peru.

Xylocopa brasilianorum bruesi new subspecies.

Female.—Larger, length 28 mm. or rather more, anterior wings 23 mm.; abdomen above much more closely punctured. The wings have a fine rosy-purple color, and are very dark.

Habitat.—San Bartolome, Peru, July, 1913 (C. T. Brues). Three females, all alike.

Maidl (Ann. k. k. Nat. Hofm. Wien, 1912, p. 312) remarks at length on the variability of *X. brasilianorum*, and gives a long list of synonyms. Undoubtedly this type presents several different forms, but specimens from any one locality are very uniform, and I believe we have to do with subspecies rather than individual variations.

Xylocopa transitoria Pérez.

Four females from Guayaquil, Ecuador, May-June, 1913 (Brues). Maidl treats this as a synonym of *X. brasilianorum*, but it is certainly distinct by the truncate end of scutellum, and green wings suffused with purple apically. A male from Guayaquil is apparently *X. brasilianorum*, but has very distinct black bands on the hind margins of abdominal segments, the extreme base of anterior tibiae light yellow, and the dark clypeal patch very large.

Females of *X. morio callichlora* Ckll. were also taken at Guayaquil. *X. frontalis viridimicans* Enderlein is a synonym of *callichlora*.

Eulaema bruesi new species.

Female.—Length about 20 mm.; superficially exactly like *E. mussitans* (Fb.), but differing as follows: Third and fifth antennal joints considerably shorter; labrum shorter; face on each side of antennae brilliant violet, below

this dark blue-green; clypeus yellowish-green suffused with coppery; tegulae dark purple-blue; upper part of metathorax suffused with blue; abdomen (except first segment) dorsally with the tegument golden suffused with rosy; wings perhaps a little darker.

Habitat.—Guayaquil, Ecuador, May–June, 1913 (C. T. Brues).

A very fine species, related to *E. mussitans*, and also to *E. polychroma* (Mocs.), but quite distinct.

***Bombus robustus* Smith.**

Huascaray, Peru, Sept. 21, 1911, 6,500 ft. (C. H. T. Townsend).

This is typical *robustus*, as described by Smith.

***Bombus coccineus* Friese.**

Matucana, Peru, June–July, 1913, 7,300 ft. alt. (Brues); Pachacayo, over 12,000 ft. (Townsend).

***Bombus funebris* Smith.**

Pachacayo, Peru, over 12,000 ft., March 27 (C. H. T. Townsend).

***Melipona mimetica* new species.**

Worker.—Length 10 mm. or a little over, robust; head, thorax and legs black, lower part of clypeus and basal half of hind tibiae obscurely rufous, apical tarsal joints chestnut red; head and thorax above with very pale ochreous hair; sides of face with short white hair; pleura with a large patch of fulvous hair above, white below; tegulae ferruginous; wings reddish; abdomen bright chestnut red, when the segments are extended to the utmost, a basal black line is seen on second to fourth; sides (but not dorsum) of apical half showing black bristles.

Habitat.—Guayaquil, May–June, 1913 (Brues).

Extremely close to the Brazilian *M. pseudocentris* Ckll., from which it differs by the black face, the lack of black (or any other) hair on the dorsum of apical part of abdomen, and the coarse black hair fringing the smooth outer face of hind tibia. The color of the legs is also very different, and the inner surface of the hind tibia in *M. mimetica* is clothed with a fine white pruinosity (not always very evident); while the hair on the inner side of the basitarsus is shining orange-golden, varying to more dusky. Eight specimens of *M. mimetica* were collected; the specific name refers to the perfect superficial resemblance to *Centris tarsata* Sm. *M. fuscipes* Friese must be a similar insect, but it is typically with ashy-fuliginous hair, with the

abdominal segments 3 to 6 showing black hair, in the manner of *M. rufiventris*. It is possible (considering the great range given) that *M. fuscipes* was composite, and included (from Peru) the present insect, since Friese says it is "very rarely fulvous-haired."

Trigona frontalis Friese.

Guayaquil (*v. Buchwald*; Alfken coll. 31).

Trigona amalthea (Oliv.).

Guayaquil (*v. Buchwald*; Alfken coll. 30).

Trigona leucogastra new species.

Worker.—Length about $5\frac{1}{2}$ mm., anterior wing 6 mm.; broad and robust, shining black; scape black, reddish only at extreme base; flagellum obscure reddish-brown beneath; mandibles edentate, ferruginous apically; face thinly beset with short silvery hairs; front, vertex, mesothorax and scutellum with coarse black hair, not dense; pleura with black hair above and thin white pruinose pubescence below; tubercles fringed with pale (brownish-white) hair; tegulae piceous; wings hyaline, with bright ferruginous costa and nervures; legs with hair partly pallid and partly black, outer side of middle tibiae with short, shining silvery hairs, under side of hind trochanters and adjacent base of femora with white hair; abdomen short, the apical segments dorsally with thin but distinct white hair-bands, and the venter, except at sides near base, covered with shining silvery white hair. In some specimens the flagellum is quite clear red beneath. The cheeks are white-pruinose.

Habitat.—Guayaquil, May–June, 1913, 17 workers (*Brues*); Guayaquil, 3 workers (*v. Buchwald*; Alfken coll. 29).

In my manuscript table of neotropical *Trigona*, this runs to *T. cressonii* D. T., from which it is easily known by the entirely different color of the wings, and the pale hair on apical part of abdomen. The wings agree with Lepeletier's description of his *T. hyalinata*, but the thorax in that species is not black-haired. Superficially, *T. leucogastra* looks exactly like *T. cupira* Sm., but that has pale face-markings, and lacks the pale abdominal hair-bands. The light hair on under side of abdomen recalls *T. postica* (Latr.), but that differs greatly in other respects.

Megachile pyrrhogastra Cockerell.

Male.—Guayaquil, May–June, 1913 (*Brues*). This sex is new; it has the following special characters:

Flagellum slender, red beneath, very slightly widened at end; face densely covered with creamy-white hair; the very thick mandibles with a bright red patch near apex; anterior coxæ with moderately long, strong spines, outer half of coxa ferruginous; anterior trochanters strongly angulate below; anterior femora mainly light reddish, more yellowish on inner face, with three black lines, the apical half on outer side largely black; these femora are also peculiarly formed, angulate beneath basally, then with the upper and lower sides parallel, until toward the apex the lower side is provided with a low keel; anterior tibiæ trigonal, red, with black on margins, the posterior outer margin very broadly black, the anterior outer one only black on basal half; anterior tarsi pale yellowish, greatly modified; first joint boat-shaped, red apically; second with a large black spot at base, and the apex prolonged into a finger-like process; inner margin of boat-shaped process with thick black hairs; hair of posterior fringe white on outer side, black and white within; claws deeply bidentate; middle and hind femora and tibiæ black, marked with red; middle tarsi cream-colored basally, light reddish apically; hind tarsi mainly dark, but outer half of basitarsus cream-color; middle coxæ with slender black spines; abdomen red with the fifth and sixth segments black, keel of sixth segment very broadly emarginate; no conspicuous apical (subventral) armature.

This is such a complicated insect that a complete description of all its peculiarities would fill pages. It differs from the male of *M. pulchra* Sm. (to which it runs in Friese's table) by the mandibles having only an apical red patch, the scape all black, flagellum black above, and the keel of sixth segment of abdomen deeply emarginate.

Megachile philinca Cockerell, variety a.

Guayaquil, May-June, 1913 (*Brues*).

The two males collected differ from the types in having the pale hair of thorax above white instead of fulvous, and the legs bright red. In the original males of *philinca* the dingy color of the legs is apparently due to immaturity, since the female has them bright ferruginous.

Megachile garleppi Friese.

San Bartolome, Peru, 1 male, July, 1913 (*Brues*).

This certainly appears to be Friese's species, but it is the sixth segment of the abdomen that is bispinose; Friese says the seventh segment, but probably by a slip of the pen, as he does not mention the sixth at all.

Megachile ecuadoria Friese.

Matucana, Peru, 2 males, June-July, 1913, 7,300 ft. (*Brues*).

The specimens are a little larger than Friese describes, but otherwise agree with the description. As Friese remarks, the insect much resembles *M. pollinosa* Spinola, but the red hair covering apex of abdomen is distinctive.

Cœlioxys haematura new species.

Female.—Length a little over 10 mm.; head black; sides of face and front with broad bands of dense pale ochreous hair; cheeks with white hair, becoming yellowish above; mandibles chestnut red; clypeus with lower margin faintly concave, not emarginate; antennæ black; hair on eyes short; thorax black below, but upper part of pleura largely red, as also the sharply pointed tubercles; mesothorax with anterior half red except in middle, the middle section with small scattered punctures, larger posteriorly, the sides with large partly confluent punctures, very dense in the median sublateral region; scutellum shining and impunctate in middle, with large scattered punctures at sides; a large broad-triangular upwardly directed median tooth on hind margin of scutellum; axillar teeth long and straight, compressed apically; pleura with the usual vertical bands of dense pale hair, and the upper part hairy nearly all over; base of scutellum with a single (not divided in middle) pale ochreous hair band; tegulæ deep ferruginous; wings strongly infuscated, stigma dark ferruginous; legs entirely bright red, anterior coxæ with small tubercles; abdomen bright ferruginous, with broad dorsal black patches on segments 2 to 4, and a round dusky spot on the sixth; hair-bands narrow and entire, ochery-white; punctures small and not dense; last dorsal segment pointed, moderately acute, the apical half strongly keeled; last ventral narrow, extending far beyond dorsal, without evident notches; venter keeled, the fifth segment with excessively minute punctures, its margin fringed with white hair.

Habitat.—Guayaquil, May-June, 1913 (*Brues*).

Very close to *C. azteca* Cresson, differing hardly at all, except in the quite distinct character of the clypeus.

Cœlioxys leucochrysea new species.

Male.—Length about 9 mm.; black, the tegulæ and legs bright ferruginous, the ventral surface of the abdomen dark ferruginous; eyes dark brown, with short hair; face densely covered with pale golden-tinted hair, this extends over front, but just before middle ocellus is a separated, heart-shaped patch; mandibles red with the bidentate apex black, and a spot of light hair at base; cheeks with a broad smooth bevelled space below; antennæ black; mesothorax and scutellum with very large quite close punctures, and a fine median raised line; scutellum very short, with a very minute apical tubercle; axillar teeth well developed, curved; bands in front and behind mesothorax, and a spot

behind each tegula, of dense pale orange hair; dense hair-band on post-scutellum ochery-white, in contrast; pleura with the usual two white hair-bands, the upper part not hairy between the bands; wings strongly infuscated, stigma dark ferruginous; anterior coxæ with short stout black spines; abdomen very distinctly but not very densely punctured; hair-bands feeble, linear, white, that bordering basin of first segment pale ochreous; apical segment 6-spined, the lower apical teeth slender.

Habitat.—Guayaquil, May–June, 1913 (*Brues*).

Very similar to *C. edentata* Schrottky, but much smaller. It seems also to resemble *C. remissa* Holmbg., of which the male is unknown. In my table of males in *Canad. Entom.*, June, 1912, it runs to *C. sayi*, which is entirely different in the ornamentation of the thorax.

***Cælixys rufibasis* new species.**

Male.—Length 9 mm.; black, with the first abdominal segment entirely, the venter of abdomen, the tegulæ and legs clear ferruginous; mandibles red with the apex broadly black; face with yellowish-white hair; antennæ black; eyes with short hair; bevelled space on cheeks below covered with white hair (not naked as in *C. leucochrysea*); mesothorax and scutellum shining, with scattered large punctures, middle of scutellum impunctate, the margin very broadly angulate; hair of occiput pure white, but anterior band of dense hair on thorax, which is widely interrupted in middle, ochrey white; two large ochery-white patches of hair in scutello-mesothoracic suture; a dense patch of light hair behind each tegula; axillar teeth rather short; wings dusky apically; anterior coxæ well spined; abdomen almost impunctate in middle, except at base; hair-bands pure white, on third and fourth segments very broadly interrupted in middle, the apical bands beyond first segment only at sides; apical segment 6-dentate, lower apical teeth slender; venter sparsely punctured.

Habitat.—Guayaquil, May–June, 1913 (*Brues*).

In my table of males in *Canad. Entom.*, June, 1912, this runs to *C. sayi*, which it does not resemble. It is extremely close to the Brazilian *C. ardescens* Skll., differing by the shorter, shining vertex; the paler thoracic ornaments; the contrasting pale ferruginous first abdominal segment; the white hair of occiput, and other small details. Thus, although they look distinct enough, the technical differences between *ardescens* and *rufibasis* are slight, suggesting the possibility that they should be treated as subspecies of a single species. *C. rufibasis* also resembles *C. assumptionis* Schrottky.

***Cælixys tumorifera* new species.**

Male.—Length a little over 10 mm.; black, the tegulæ, legs and mandibles (except at apex) ferruginous; abdomen beneath dark ferruginous, more or

less stained with blackish, but above wholly black, except a red stain at extreme sides of segments; hair of head and thorax dull white, stained with ochreous dorsally; face densely covered with ochery-white hair; cheeks beneath with no hairless space; tubercles red, fringed with white hair; anterior band of thorax very narrow, confined to less than the lateral third of mesothoracic margin; base of scutellum with two large ochery-white hair spots, far apart; pleura sparsely hairy above between the bands; eyes brown, with rather short hair; antennæ black; no hair-patch in front of middle ocellus; vertex behind ocelli with only about three punctures, but these large; mesothorax impunctate in middle from front to hind margin, at sides with many but not dense punctures, of different sizes; anterior middle of mesothorax swollen; scutellum impunctate in middle, with large scattered punctures at sides; hind margin strongly but obtusely angulate, turned upwards; axillar teeth well developed, their button-like ends slightly turned inwards; wings strongly dusky, stigma and nervures piceous; anterior coxæ without distinct spines; abdomen shining, sparsely punctured in middle, with a distinct dorsal carina as well as a ventral one; hair-bands of abdomen dull white, only continuous on first segment; basal transversely elongate hair-patches on segments 3 to 5, but not on 2; apical segment 7-toothed, the median tooth or spine long and sharp.

Habitat.—San Bartolome, Peru, July, 1913 (*Brues*).

Closely related to *C. pyrata* Holmbg. (*carinata* Sm.), but distinct by the character of the mesothorax.

The following key will be useful for the separation of the above species of *Coeliorys*:

- | | |
|---|---------------------------|
| Scutellum red, with a large median process..... | <i>hamatura</i> Ckll. |
| Scutellum black, without such a process..... | 1 |
| 1. Scutellum strongly angulate in middle, the apical region smooth; hair at base of scutellum forming two large widely separated spots. | |
| | <i>tumorifera</i> Ckll. |
| Scutellum not strongly angulate in middle; hair at base not in two widely separated spots | 2 |
| 2. Scutellum short, strongly punctured all over; first abdominal segment above black | <i>leucochrysea</i> Ckll. |
| Scutellum longer, subangulate, smooth in middle; first abdominal segment above light red | <i>rufibasis</i> Ckll. |

Hypanthidium ecuadorium (Fries).

Guayaquil, May-June, 1913, four (*Brues*).

Anthidium 22-punctatum Fries.

Guayaquil, May-June, 1913, 1 male, 2 females (*Brues*).

Anthidium matucanense new species.

Male.—Length about 12 mm.; black, with long hair; clypeus, cuneiform marks filling space between clypeus and eye, greater part of outer face of mandibles, and small spot above each eye pale yellow (primrose yellow); antennæ black, flagellum very obscurely reddish beneath; thorax and legs wholly without light tegumentary markings; mesothorax very densely punctured; tegulæ black; wings dilute fuliginous; hair of head mainly white (long and snow-white on clypeus), but strongly mixed with black on front, cheeks anteriorly and above, and vertex, all black in region of ocelli; hair of thorax greyish-white mixed with longer black hairs, on ventral surface wholly pale; hair of abdomen greyish-white at base, but largely mixed with black on second segment, and beyond that black; femora with black hair; anterior and middle tibiæ with black hair on outer side, and long shining white hair behind; hind tibiæ black-haired, with short dark brown hair on inner side and a patch of appressed white hair at apex above; tarsi with white hair on outer side and dark reddish on inner; first five abdominal segments each with four pale yellow spots, sixth with two spots, apex without spots; lateral spots on first three segments large, more or less excavated on inner side, those on fifth reduced to minute dots; apex tridentate, the middle tooth slender, the lateral ones taking the form of broad lobes, with convex outer margins.

Habitat.—Matucana, Peru, June–July, 1913 (*Brues*).

Very close to *A. garleppi* Schrottky, from Apurimac. Matucana is about 50 miles inland from Lima; Apurimac is about 250 miles southeast from Matucana, on the other side of the mountains. It is possible that the species now described should be regarded as a subspecies of *garleppi*, but it differs in the abundant black hair. These insects belong to typical *Anthidium*.

Triepeolus megadelphus new species.

Male.—Length a little over 11 mm.; black, mandibles dark red except at apex, antennæ black; legs bright ferruginous, middle tibiæ with a blackish stain on outer side, greater part of hind tibiæ blackish, hind femora black beneath except at base and apex, and largely black at sides; tubercles and tegulæ bright ferruginous; wings dilute fuscous; hair-patches of body cream-color, mesothorax with two straight bars, not swollen at end; abdomen with interrupted bands, entire or almost so on fifth and sixth segments, black area on first segment acutely angulate at sides; fringes on fourth and fifth ventral segments creamy white. Clypeus densely rugoso-punctate; pleura closely and strongly punctured, its lower part bare or almost, its upper part with pale greyish hair, in the middle of which is a bare space; spurs rufopiceous.

Habitat.—Guayaquil, May–June, 1913 (*Brues*).

Very close to *T. buchwaldi* (Friese), and marked in a similar manner, but larger, the markings much paler (less yellow), the head

much broader, the bare part of pleura much larger, the band on second abdominal segment more widely interrupted, etc. Among the North American species it resembles *T. sublunatus* Ckll. as closely as any.

***Ceratina triangulifera* new species.**

Female.—Length about 9 mm.; bright peacock green, with slight golden tints on metathorax, and bases of second and third abdominal segments, except at sides, dark, with purple tints; no lateral face-marks; clypeus with a large white apical triangular area, which is continued on each side as a narrow stripe; labrum black; mandibles black, with a green spot at base; flagellum with a very obscure testaceous tint beneath; face and front densely and coarsely punctured; cheeks with large punctures, except the upper part behind, which is smooth and impunctate; mesothorax strongly punctured, with a smooth discal area; tubercles green; tegulae dull rufotestaceous; wings reddish-hyaline; coxae, and hind femora and trochanters in front, green, legs otherwise piceous, but the anterior knees, and stripe on anterior tibiae, white; abdomen well punctured, rugose apically as usual.

Habitat.—Guayaquil (*v. Buchwald*; Alfken coll. 28).

A distinct species, resembling *C. viridula* Sm., but that has green legs. In H. S. Smith's key (Trans. Am. Ent. Soc., 1907, p. 119) it runs out at 19. In Schrottky's key (Zeits. Hym. Dipt., 1907, p. 480) it runs nearest to *C. oxalidis*, which it does not resemble. The general appearance is that of *C. lacta* Spin., which is however much larger, and otherwise different.

***Centris nitida geminata* new subspecies.**

Female.—Length about 13 mm.; anterior wing 10 mm.; black, the thorax above with dense canary-yellow hair, which extends also down the sides, but gives way to white ventrally; head broad, eyes dark brown; flagellum ferruginous beneath, except at base and apex; face-marks light yellow, as follows: lateral marks very narrow, ending in a sharp point above at about level of antennae; clypeus with two very large oblique yellow patches, separated by a dark vertical band in middle; labrum and greater part of mandibles very pale yellow; hair of cheeks white below, but above and on occiput yellow; hair of vertex black, yellow between ocelli; hair of front yellow, black at extreme sides; clypeus shining, with rather small punctures, flattened in middle, with a short rudimentary keel; scutellum shining with well-separated punctures; tegulae pale ferruginous; wings strongly suffused with brown, nervures dark; legs black, anterior tarsi red at apex; anterior and middle femora and tibiae with white hair behind; middle tibiae short and thick, with short black hair in front; front tarsi with ferruginous hair on inner side, and whitish (strongly plumose) on outer; middle tarsi with black hair, the basitarsus also with long

brown hair behind; middle basitarsi on inner side with a long hollowed (boat-shaped) structure, which is conspicuously transversely striated; hind femora with white and brown hair; hind tibiae with a very large black scopa, which also covers the basitarsus; abdomen shining black; first segment with much yellowish-white hair, extending right across; second and third with very scanty short black hair; fourth with much black hair, and a little pale at apex laterally; apex with red hair in middle and white at sides.

Habitat.—Guayaquil, May–June, 1913 (*Bruce*).

C. nitida Smith was described from Honduras, and according to Smith's brief description differs from *geminata* in the two basal joints of flagellum wholly black (second, and apex of first, red beneath in *geminata*), middle and hind legs with only black hair, apex of abdomen with only fusco-ferruginous hair. Also, *C. nitida* is said to have white tegulae. *C. confinis* Pérez is evidently very close to *C. nitida*, but is not *geminata*. In the Argentine the same group is represented by *C. nigriventris* Burmeister. I suppose *geminata* to be a subspecies of *nitida*, but it remains to be determined whether Smith's species has the peculiar structural characters observed in *geminata*.

A feature of the venation deserves notice. In *C. nitida geminata* the hind wings have the median cell obliquely truncate at end, and the transversomedial nervure with its upper end vertical, forming two right angles. In *C. rhodopus* Ckll. the hind wings have the median cell obtusely pointed at end (the free end of cubital nervure lacking) and the transversomedial with its upper end oblique.

Melitoma euglossoides Lep. & Serv.

Guayaquil, May–June, 1913, 18 males (*Bruce*); Guayaquil, 2 males, 2 females (v. *Buchwald*; Alfken 16).

All these have the scape red, and belong to the South American race described by Smith as *fulvifrons*. The northern race (Guatemala City, *Rodriguez*; Quirigua, Guatemala, *W. P. Cockerell*; Rio Nautla, Mexico, *Townsend*; Comal Co., Texas) has the scape black, and must be called *M. euglossoides marginella* (Cresson).

Xenoglossa citrullina Cockerell.

Guayaquil, May–June, 1913 (*Bruce*). One male.

Previously known only from Peru.

Florilegus pavoninus new species.

Female.—Length about 11 mm., robust, black, the hind tarsi ferruginous apically, the abdomen with strong green and crimson tints; mandibles with a

broad orange streak; clypeus very strongly and densely punctured, and with a median ridge; malar space linear but present; flagellum, except the apical and the two basal joints, ferruginous beneath; face, cheeks and sides of thorax with greyish-white hair; hair of vertex, band across mesothorax and posterior middle of same, scutellum, large tuft on front of tubercles, and ventral surface of thorax, all black; other hair on head and thorax above brownish-white; mesothorax shining, well punctured, posterior middle impunctate; scutellum with the side only very sparsely and feebly punctured; tegulæ dark, with reddish-brown margin; wings dilute smoky, nervures dark; outer side of third s. m. strongly angled; upper apical side of marginal cell evenly curved; hair of legs mainly shining white, but ferruginous on inner side of tarsi; anterior tibiæ with a small, and middle ones with a large, black patch on outer side; hair at base of hind tibiæ above dark fuscous; spurs clear ferruginous; abdomen with loose brownish-white hair at base; second segment with a basal band of bright orange-fulvous tomentum, greatly broadening at sides; third with a very broad band of the same color, and fourth covered with the same except a subquadrate apicomedian patch; fifth segment with the hair in middle sooty-black, at sides cream-color; sides of venter with conspicuous white hair. Maxillary palpi 5-jointed, the joints measuring in microns: (1) 160, (2) 120, (3) 96, (4) 96, (5) 112. Labial palpi with joints measuring (1) 1360, (2) 640, (3) 144, (4) 120. Paraglossæ slender, extending as far as labial palpi.

Male.—Length 9–10 mm.; hair of head and thorax pale, greyish-white to pale fulvous, without black; antennæ about $8\frac{1}{2}$ mm., flagellum ferruginous beneath, the last two joints wholly black; clypeus lemon yellow, strongly punctured; labrum black, sometimes with a yellow spot; base of mandibles wholly black; hair on outer side of middle and hind legs pure white, bright orange-fulvous on inner side of hind tarsi; abdominal bands greyish-white, the other parts of abdomen with coarse black hair.

Habitat.—Guayaquil, Ecuador, May–June, 1913, 15 females, 3 males (*Brues*); Guayaquil, 2 females, 4 males (*v. Buchwald*; Alfken coll. 15).

The type is a female. This is the first South American *Florilegus*, unless *Tetralonia festiva* Sm., from Pará, should be referred to that genus. *T. festiva* (female) differs from *F. pavoninus* by the aeneous (not pure black) tint of thorax above, the pale fulvotestaceous tegulæ, the ferruginous nervures, etc. The following key will serve to distinguish the males of *Florilegus*:

- Middle and hind legs ferruginous (Cuba).....*lanieri* (Guér.).
 Legs black 1
 1. Larger; labrum nearly all yellow (U. S.)*condigna* (Cress.).
 Smaller; labrum black, or with a yellow spot (Ecuador) ...*pavoninus* Ckll.

The female of *F. condigna* is much less like *F. pavoninus*, the abdominal bands being creamy-white or greyish-white.

Florilegus purpurascens new species.

Female.—Length about 11 mm., very robust, black, the hind tarsi dull ferruginous apically, the abdomen with strong purple and green tints on the first three segments, and the hind margins of these segments broadly pellucid testaceous; mandibles simple, with an orange subapical mark, but base wholly black; head very broad; eyes greenish; face, labrum, cheeks and occiput with greyish-white hair, but vertex with black; flagellum, except the first two joints, ferruginous beneath; clypeus brilliantly shining, strongly punctured, with a median ridge; mesothorax and scutellum shining, the mesothorax with rather weak punctures, the scutellum with extremely minute weak punctures; hair of thorax black, except a very narrow white fringe along upper border of prothorax, and a large and dense fringe round hind border of scutellum, thence extending over metathorax, all of which is clear fulvous; tegulae black with slight reddish margins; wings dilute fuliginous; outer side of third s. m. very strongly angled; hair of legs much as in *F. parvotinus*, but that on inner side of hind tarsi and apical part of tibiae is black, while the black patch on outer side of middle tibiae covers most of the surface; hind spurs black, red at end; abdominal banding of the same type as that of *F. parvotinus*, but the bands are very pale fulvous, that at base of second segment rudimentary, while the black (black haired) area on fourth extends from base to apex, and occupies nearly the middle third; fifth segment with sooty-black hair, white at sides; second and third segments each with a round patch of creamy-white hair at each extreme side. Maxillary palpi 5-jointed, the joints measuring as follows in microns: (1) 160, (2) 144, (3) 72, (4) 64, (5) 88. Labial palpi with joints measuring (1) 1200, (2) 856, (3) 144, (4) 96. Paraglossae slender, extending as far as labial palpi. Blade of maxilla 768 μ across at broadest part, the hyaline area 192 μ wide.

Habitat.—Guayaquil, May–June, 1913 (*Brucs*), 3 females.

Easily known by the black hair of pleura, and other characters. The abdominal bands vary to white, and the hair on hind part of thorax may be creamy-white.

Tetralonia melectura new species.

Male.—Length about 11 mm., black, antennae with the very long flagellum dull ferruginous beneath; clypeus strongly punctured, pale yellow; labrum black with a very large pale yellow patch; mandibles with apical half orange on outer side, but base entirely black; eyes very prominent; hair of face, cheeks and front white, but of top of head black; mesothorax with a broad band of greyish-white hair in front, extending down in front of tubercles at sides, but hair of thorax otherwise black; mesothorax shining, with scattered punctures; scutellum depressed in middle; tegulae black; wings fuliginous, with black nervures, second s. m. small; legs with mainly black hairs, but anterior tarsi with fulvous, ferruginous on inner side, middle and hind tarsi with dark ferruginous on inner side; abdomen with black hair, except white

patches on sides of third to fifth segments, spots only on third; short bands on the others. Maxillary palpi bristly, 6-jointed, the joints measuring as follows in microns: (1) 208, (2) 176, (3) 192, (4) 112, (5) 96, (6) 112. Labial palpi with joints measuring: (1) 1280, (2) 640, (3) 120, (4) 128. Paraglossæ long and slender.

Habitat.—Guayaquil (v. *Buchwald*; Alfken coll. 14).

A very distinct species, superficially rather like *T. zebra* Friese. The ornamentation of the abdomen recalls that of *T. melectoides* Smith, from Villa Nova on the Amazon, but that has hyaline wings and various other distinctive characters.

I will take this occasion to note that *Tetralonia pygialis* Buyss., from Venezuela, evidently belongs to *Thygater*.

***Melisodes ecuadoria* Bertoni & Schrottky.**

This species, found at Guayaquil, was named by Friese in manuscript, and published with only a few words of description by Bertoni and Schrottky in 1910. Only the female was known; but the male before me, from Guayaquil, May–June, 1913 (*Brues*), has the characters to be expected in the species, and being from the same locality, is presumably identical. The maxillary palpi agree sufficiently with the description and figure of Bertoni and Schrottky.

Male.—Black, abdomen with metallic tints; clypeus lemon yellow, with a black spot on each side; labrum and large patch on base of mandibles cream-color; eyes black; hair of head and thorax ferruginous, paler beneath, black on posterior middle of mesothorax and on scutellum; antennæ very long, flagellum clear ferruginous beneath; tegulæ ferruginous; wings dusky; nervures dark reddish; second s. m. large; upper apical side of marginal cell angulate, though obtusely, not evenly rounded as in *Florilegus pavoninus*; tarsi, anterior tibiæ in front, and the other tibiæ at apex, ferruginous; hind tibiæ with black hair on outer side; abdominal segments with broad basal fulvous hair-bands, a little black hair at sides of apical plate. Maxillary palpi 4-jointed; first joint large and stout, the others measuring in microns about (2) 160, (3) 152, (4) 80. Hyaline area of maxillary blade transversely striated.

***Leptometria pacifica* new species.**

Male.—Length about 9 mm.; black, with the clypeus, labrum, and large patch at base of mandibles light yellow; rest of mandibles dark reddish; antennæ long, the flagellum dark fuscous above, and pale reddish-testaceous beneath, except at base; tarsi and apices of tibiæ obscure rufotestaceous; hair of head, thorax and legs abundant, pale ochreous; abdomen densely covered with appressed warm ochreous hair; vertex shining; mesothorax and scu-

tellum shining, with strong well-separated punctures; metathorax basally with strong punctures like those on scutellum, but a triangular area beyond this shining and impunctate; tegulæ fuscous in middle, testaceous at sides; wings dusky, nervures sepia; b. n. meeting t. m.; second s. m. extremely broad, receiving first r. n. at about the beginning of its last third; hind wings with venation normal for the genus; hind basitarsi ordinary, not toothed; abdomen with fine distinct punctures.

Female.—More robust; no light face-marks; clypeus strongly punctured; labrum with long ochreous hair; antennæ short, flagellum clear fulvous beneath except at base, scopa on hind tibiæ and tarsi long and loose, strongly plumose, pale ochreous; hair on inner side of hind basitarsi ferruginous.

Habitat.—Guayaquil, one of each sex, the male the type (*v. Buchwald*; Alfken coll. 18); Guayaquil, 1 female, May–June, 1913 (Brues).

Closely related to *L. pereyræ* Holmbg., but the male differs by the longer third antennal joint, the darker tegulæ, the redder hair of abdomen, the dark tibiæ, etc.

CHALEPOGENUS Holmberg.

Tetrapedia, as generally understood, is certainly composite. *T. diversipes* Klug, the type of the genus, has the first recurrent nervure joining the second s. m. before the middle, and the hind spur long pectinate. *T. plumipes* Smith, though very different in color, has the same structural characters. There exists, however, a group of species with simple hind spur, and the first r. n. joining the second s. m. near its end. In *Psyche*, 1912, p. 57, I described a species of this latter group under *Tapinotaspis*, remarking that it was certainly not congeneric with the type of *Tetrapedia*, but could only go in *Tapinotaspis* if we altered the definition of that genus. Upon further investigation, I conclude that the proper name for insects of this type is *Chalepogenus*, the type of which is *C. muelleri* (*Tetrapedia muelleri* Friese; *Chalepogenus incertus* Holmbg.). *Desmotetrapedia* Schrottky, 1909, having the same type, is strictly congeneric. My species described in the place just cited will stand as *Chalepogenus heathi* (Ckll.). The same genus extends into Central America, *Chalepogenus moestus* (*Tetrapedia moesta* Cresson) being a typical representative. Other Central American species are *C. calcarata* (*Tetrapedia calcarata* Cress.) and *C. mayarum* (*Tetrapedia mayarum* Ckll.).

Chalepogenus buchwaldi new species.

Female.—Length nearly 7 mm.; black, the wings reddish fuliginous, slightly paler but not at all whitened apically; hair of labrum and sides of face dull

white; cheeks with appressed white hair; vertex with extremely scanty black hair; scape red in front, fuscous behind, except at base; flagellum short, fuscous, rufotestaceous beneath; mesothorax dull from a very fine dark pruinose pilosity; scutellum with short erect black hairs; legs rufopiceous, hind legs redder behind; hair of legs black, except the large brush on outer side of hind basitarsi, which is creamy white, dark fuscous at apex.

Habitat.—Guayaquil (*v. Buchwald*; Alfken coll. 26).

Almost exactly like *C. moestus* (Cress.), but easily known by the white hair on outer side of hind basitarsi, and the largely red scape. Both have the anterior basitarsi broadened and modified.

***Tetrapedia alfeni* new species.**

Female.—Length a little over 7 mm.; black, the wings dark fuliginous, not whitened apically; hair of face and cheeks white, of vertex, thorax, abdomen and legs black, except that the hind tibiae have long white hairs on inner side; tongue golden; clypeus shining, sparsely punctured; scape bright chestnut red, fuscous in middle; flagellum dull reddish beneath, except at base; mesothorax shining, strongly and rather closely punctured; first r. n. joining second s. m. before middle; hind spur very long pectinate; abdomen shining black, beneath with long black hair.

Habitat.—Guayaquil, 2 females (*v. Buchwald*; Alfken coll. 27); Guayaquil, May–June, 1913 (*Brues*).

Nearly the same as *T. maura* Cresson, but the mesothorax is strongly and rather closely punctured, and the hind tibiae have no pale hair at apex on outer side. Both have a stout tooth at base of anterior basitarsi.

***Exomalopsis zexmeniae* Cockerell.**

Guayaquil, 2 females, 1 male (*v. Buchwald*; Alfken coll. 25); San Bartolome, Peru, July, 1913, 1 male (*Brues*).

The male, not before known, is almost exactly like that of *E. penelope* Ckll., but has the tegulae very dark rufous, instead of amber color as in *penelope*. The female is readily known from *penelope* by the scutellum having black hair and the scopa of hind tarsi being wholly black-haired behind. The female is almost identical with *E. paraguayensis manni* Ckll., from Natal, Brazil; but *manni* has a shorter clypeus, and the scutellum has white hair along its hind border. The type of *manni* had the abdominal segments extended, when contracted they would appear as in *zexmeniae*.

Undoubtedly these insects belong to *E. globosa* (Fabricius), as

understood by Friese and Ducke. *E. globosa* was very briefly described by Fabricius, and came from the West Indies; Friese examined specimens from Porto Rico and St. Thomas. Friese's description does not quite accord with *sexmenia*, and I suspect that the true *globosa* is confined to the West Indies. The single female from Columbia, cited by Friese, was very likely *E. sexmenia*.

According to Ducke, *E. analis* Spinola (female, Pará), *E. villipes* Sm. (female, Brazil), *E. tarsata* Sm. (female, Santarem) and *E. artifex* Sm. (male, female, Pará) are all synonyms of *E. globosa*. The descriptions do not altogether support this opinion, but they are not very detailed. *E. artifex* differs from *E. sexmenia* in the female by the dense pale fulvous pubescence on the scutellum, and in the male by the rufotestaceous labrum (black in *sexmenia*). There is no mention of any dark hair on the thorax above in *analis* or *villipes*. In *villipes* the mandibles are ferruginous; in *sexmenia* and *manni* they have only a red spot. The descriptions of the legs of *villipes* and *tarsata*, if correct, do not agree with *sexmenia* or *manni*. I therefore conclude that the relationships of all these species or races need further investigation; but it seems not improbable that *manni* is the same as *tarsata*, and *artifex* a synonym of *analis*. Furthermore, it is unlikely that *manni* and *sexmenia* are more than races of a single species.

Exomalopsis bruesi new species.

Female.—Length about 7 mm.; broad, robust, black; mandibles dark ferruginous, with the base black; flagellum dull rufotestaceous beneath except at base; small joints of anterior and middle tarsi, and hind tarsi entirely clear ferruginous; tegulae black; wings dusky hyaline, the apical margin darker, stigma and nervures light ferruginous; clypeus shining, not densely punctured; hair of head and thorax mainly pale ochreous above (including dense bands at sides of face) and white below, but black on disc of mesothorax posteriorly, and on disc of scutellum; a slight fringe of pale hair along hind border of scutellum, and a tuft of ochreous hair on postscutellum; hair of legs mostly white, but a little fuscous on outer side of anterior tibiae, a slaty or black patch covering nearly all of outer side of hind tibiae, and the large scopa of hind tibiae and tarsi longitudinally tricolored, creamy white in front, ferruginous on inner side and black behind; spurs pallid; first two abdominal segments shining black, the first with a tapering pale fulvous hair-patch on each side, the second with a pair of large oblique orange-fulvous patches; remaining segments densely covered with orange-fulvous hair, but long white hair visible at extreme sides subventrally.

Habitat.—San Bartolome, Peru (type locality), 2 females, July, 1913 (*Brues*); Guayaquil, May-June, 1913, 2 females (*Brues*).

Another member of the *E. globosa* group, but quite distinct by the character and colors of the pubescence on hind legs and abdomen.

For ready reference, I give a table to separate the small Anthophorid bees described above:

Hair of thorax black	1
Hair of thorax at least partly pale	2
1. Mesothorax shining, strongly punctured	<i>Tetrapedia alfeni</i> Ckll.
Mesothorax appearing dull, without evident punctures.	
	<i>Chalepogenus buchwaldi</i> Ckll.
2. Females	3
Males	5
3. Hind tarsi without black hair; abdomen mainly covered with orange hair.	
	<i>Leptomertia pacifica</i> Ckll.
Hind tarsi with much black hair	4
4. Hind tibiae without black hair on outer side....	<i>Exomalopsis zexmenia</i> Ckll.
Hind tibiae with black hair on outer side.....	<i>Exomalopsis bruesi</i> Ckll.
5. Clypeus yellow	<i>Leptomertia pacifica</i> Ckll.
Clypeus black; tarsi red	<i>Exomalopsis zexmenia</i> Ckll.

Agapostemon nasutus Smith.

San Bartolome, Peru, July, 1913, 1 male (*Brues*).

Augochlora binghami Cockerell.

Guayaquil, May-June, 1913, 1 female (*Brues*); Guayaquil, a very purple female (*v. Buchwald*; Alfken coll. 21).

In the absence of males, the reference to *A. binghami* is perhaps a little uncertain, but the purple tints and prominent lateral angles of prothorax agree with those of *A. binghami* from Guatemala.

Augochlora metallica (Fabricius).

Guayaquil, 3 females (*v. Buchwald*; Alfken coll., 23); Guayaquil, May-June, 1913, 1 female (*Brucs*).

I think that this is undoubtedly *A. metallica*, at least as interpreted by F. Smith, who states that it comes from Colombia. It accords exactly with my notes and recollection of Smith's specimens in the British museum. It is very close to the Brazilian *A. iheringi* Kkll., but has the abdomen green right across the segments, except the black hind margins. The first r. n. enters the apex of second s. m. or

joins second t. c.; in *A. feronia* Sm. it enters the base of third s. m. The wings are conspicuously dusky.

Two males from Guayaquil, May-June, 1913 (*Brues*), are referred here, in spite of the fact that they have the punctures of mesothorax, and scutellum less crowded and more distinct, the striæ at base of metathorax coarser and less numerous, and the tegulæ reddish instead of piceous. I should have thought them to belong to a distinct though very closely allied species, had I not previously found somewhat similar sexual differences in *A. quiriguensis* Ckll. The labrum, anterior edge of clypeus and nearly all of mandibles are cream-color. The tarsi are dark.

***Augochlora vesta* Smith.**

Guayaquil (*v. Buchwald*; Alfken coll. 19, 20).

After I had determined this as *vesta*, I found that one of the specimens carried a label with the same determination made by Alfken. These specimens are true *A. vesta*, with golden-green head and thorax. A female taken by Brues at Guayaquil, May-June, 1913, has the head and thorax blue-green, and the first abdominal segment largely brassy though with red tints, but green at base and sides. I cannot separate this from a female from Villa Encarnacion, Paraguay, sent by Schrottky as *A. vesta* var. *cupreola* Ckll. A cotype of the real *cupreola*, from Chapada, is larger and has the punctures on posterior middle of mesothorax widely separated, and is obviously a different species. It seems probable that the form of *A. vesta* represented by the Brues and Schrottky specimens just cited should be called var. *terpsichore* (Holmberg). Schrottky treats *A. terpsichore* as a synonym of *A. cupreola*.

***Augochlora thalia* Smith.**

Guayaquil, May-June, 1913, 3 males (*Brues*).

These specimens do not appear to differ from the Brazilian *A. thalia*.

***Augochlora cladopyga* new species.**

Male.—Length about $5\frac{1}{2}$ mm., anterior wing 4; brassy green, with thin white pubescence; head broad, eyes very deeply emarginate; front minutely granular, dull; face shining emerald green, contrasting with the golden-green clypeus, the lower margin of which is broadly very pale yellow; mandibles

(except rufous apex) and labrum pale yellow; lower part of cheeks (beneath) shining golden-green, with slight coppery tints; antennæ long, black basally; flagellum pale testaceous beneath except at extreme base; fourth antennal joint broader than long; lateral angles of prothorax not very prominent; mesothorax moderately shining, minutely sculptured; scutellum more shining; area of metathorax large, at least as long as scutellum, rough, with indistinct oblique striæ; tegulæ rufotestaceous; wings dusky hyaline, stigma (which is large) and nervures red-brown; second s. m. extremely small and narrow, first r. n. meeting second t. c.; femora yellowish-green; knees and ends of tibiæ clear ferruginous, but greater part of tibiæ fuscous; tarsi pale testaceous or almost whitish, darkened apically; abdomen elongate, narrow, subclavate, with thin hoary pubescence; no vibrissæ; venter dark reddish brown, not metallic, the hind margins of segments whitish.

Habitat.—Guayaquil, May–June, 1913 (*Brues*).

Closely allied to *A. seminigra* Ckll., but readily separated by the greener abdomen, paler flagellum, etc. In Vachal's table (*Misc. Ent.*) it runs to *A. brochidens* Vach. from the Argentine Republic, but is not identical.

Augochlora notophos (Vachal) var. *nothus* new variety.

Guayaquil (*v. Buchwald*). Alfken coll. 22. The two male specimens before me represent a species very close to *A. notophos* Ckll., but distinct. They run in Vachal's table to *A. notophos*, and are provisionally referred to that species as a variety. Vachal, in describing the female of *notophos*, stated that he had no less than 32 specimens, from British Guiana, various parts of Brazil, Bolivia and Peru. He also had seven males, from Brazil and Peru. It seems unlikely that such a widespread and apparently common species should not have been earlier described; and when we look in the Brazilian fauna for a species agreeing essentially with *notophos*, we find *A. diversipennis* (Lep.), which Vachal did not include in his tables and evidently did not recognize. However, a single female *notophos* which Vachal loaned me years ago seemed nearest to *A. acidalia*, though quite distinct. It may well be that Vachal's *notophos* was composite, and was at least largely founded on *diversipennis*. The Guayaquil bees are quite of the type of male *diversipennis*, differing by the dark ferruginous (instead of yellow) tarsi, the paler vibrissæ of first two abdominal segments, and the anterior margin of clypeus narrowly dark reddish. The thickened hind margin of metathoracic enclosure is angulate or bracket-like, whereas in *diversipennis* it is evenly rounded.

From *A. notophos* the Guayaquil bees differ as follows: mandibles red, with a green basal spot; third antennal joint dull ferruginous; disc of mesothorax more closely punctured, green or golden-green, with no dark area; scutellum with golden tints; area of metathorax conspicuously angulate behind; tarsi ferruginous.

If my suspicion that typical *notophos* is *diversipennis* proves correct, the present insect will stand as a distinct species, *A. (Augochloropsis) nothus* Ckll.

***Augochlora matucanensis* new species.**

Female.—Length about 7 mm., anterior wing 6; brilliant yellowish-green, front and sides of face more blue green, contrasting with the golden-green clypeus and supraclypeal area; pubescence scanty, very pale brownish; head very large; clypeus strongly, not very densely, punctured, the lower margin black; mandibles black with a small green basal spot and the apex broadly dark red; labrum broad, not bidentate or emarginate; flagellum dusky testaceous beneath; ocelli small, close together; eyes deeply emarginate; front and vertex minutely, densely, granular-punctate; occipital margin with a sharp border; vertex and checks very large; checks obtusely angular below and behind; distance from top of eye to occipital margin nearly as great as to antenna; angles of prothorax well-marked; mesothorax and scutellum brilliantly shining, with extremely fine punctures, close even on posterior middle of mesothorax; pleura closely punctured; area of metathorax not defined, marked by fine oblique striæ, some of which become transverse in the middle, but the apical part is broadly smooth and shining, with no sharp or distinct rim; tegulæ rufopiceous; wings reddish dusky, stigma and nervures dull pale reddish; first r. n. entering basal corner of third s. m. or meeting second t. c.; legs piceous, with pale hair, anterior femora green beneath; hind spur simple; abdomen shining yellowish-green, very finely punctured, hind margins of segments not darkened or vibrissate.

Habitat.—Matucana, Peru (type locality), 4 females, June–July, 1913, 7,300 ft. (*Brues*).

Also one from foothills near Lima, Peru, at flowers of *Heliotropium*, Dec. 5 (*C. H. T. Townsend*). In Vachal's table (*Misc. Ent.*) this runs out at 61 (p. 48). I cannot identify it with any species described from Peru, Brazil, etc. It is readily known by the shape of the head and the sculpture of the metathorax, but the head varies in size.

The above species of *Augochlora* may be readily separated as follows:

Abdomen red or with strong red tints	1
Abdomen not red	2
1. Thorax with golden or coppery tints	<i>vesta</i> Sm.
Thorax entirely bright bluish-green	<i>vesta terpsichore</i> (Holmbg.).
2. Tibiæ and tarsi entirely clear red (males)	<i>thalia</i> Sm.
At least tibiæ partly dusky or dark	3
3. Hind margins of abdominal segments broadly black	4
Hind margins of abdominal segments not black	5
4. Larger; hind spur of female pectinate	<i>binghami</i> Ckll.
Smaller; hind spur of female not pectinate	<i>metallica</i> (Fabr.).
5. Very small male; hind tibiæ red at base and apex; abdomen narrow, subclavate	<i>cladopyga</i> Ckll.
Larger, length about 7 mm., or rather more; abdomen not subclavate...	6
6. Punctures of mesothorax large	<i>nothus</i> Ckll.
Punctures of mesothorax minute	<i>matucanensis</i> Ckll.

Lonchopria inca new species.

Male.—Length 10½–11 mm.; black, with abundant long hair, which is dull white and black (the general effect grey), pale orange on inner side of tarsi; hair of face and cheeks long and white, white also on middle of vertex, but a little black at sides of face, more at sides of front, and upper part of front and most of vertex with black hair; thorax with dull white hair, mostly black on disc of mesothorax and scutellum, black also on mesopleura; hair of legs mainly pale, but black on outer side of tibiæ; hind tibiæ with very long erect silvery hairs in front, hind basitarsi with extremely long hairs in front and behind; hind femora with black hair in front; abdomen with long loose white hair on first three segments, on third with black subapically, and a narrow pure-white marginal band, interrupted in middle; fourth and fifth segments also with narrow white hair-bands, but the erect hair on fourth white basally and otherwise black, that on fifth and sixth black, fifth with long spreading white hairs at sides; head broad, vertex strongly depressed on each side of ocelli; antennæ black, rather long; mandibles simple, broad at end, the apex red; malar space rather large, but shorter than broad; mesothorax and scutellum smooth and shining, with scattered extremely minute punctures; tegulæ piceous; wings faintly dusky, nervures piceous, the narrow stigma rufous bordered with piceous; second s. m. broad, receiving first r. n. in middle; third t. c. much bowed outwards; b. n. falling far short of t. m.; area of metathorax large, triangular, dull at sides, shining in middle; abdomen shining, with perhaps a very faint greenish tint.

Habitat.—Two males, Matucana, Peru, June–July, 1913 (*Brues*).

In Friese's table this runs out, because the thoracic hair is mixed white and black. Our insect is really close to *L. rubriventris* (Friese), which it much resembles, differing in the larger size, long hair on hind legs, much larger area of metathorax, etc. In *L. inca*

the inner orbits strongly converge below, which is not the case in *rubriventris*, but they agree in the simple mandibles. The mandibles of male *L. chalybæa* (Friese) are strongly bidentate, while those of *L. thoracica* (Friese) are as strongly tridentate. In *L. thoracica* the b. n. almost meets the t. m. Friese, in describing his genus *Biglossa* (= *Lonchopria*), did not indicate a type. His first species, *thoracica*, is hereby designated the type of *Biglossa*.

***Colletes miminca* new species.**

Male.—Length about $10\frac{1}{2}$ mm.; black, head and thorax with abundant long black and white hair; clear white on face (some black at extreme sides) and cheeks, nearly all black on front and vertex, white on occiput; on thorax above the hair is mixed black and white, the effect being rather dark grey, on pleura it is largely black; the legs have pale hair, light ochreous on inner side of tarsi; the abdomen has long greyish-white hair on the first segment, the other segments are rather thinly covered with short, easily abraded, pale ochreous furfuraceous pubescence, and have in addition thin long hair, only clearly visible in lateral view, this hair being white at the base of the second, and slightly on the bases of the third and fourth segments, but otherwise black; extreme apex with fuscous hair; no hair-bands; head very broad; eyes prominent; antennæ black, third joint shorter than fourth, fourth shorter than fifth; joints of middle of flagellum much longer than broad; clypeus with a shallow median sulcus; mandibles bidentate, rufous at extreme tip; labrum with three strong pits or grooves; malar space extremely long, more than twice as long as its apical breadth, its length about equal to distance from notch to base of mandible; prothoracic spines not evident; mesothorax and scutellum shining, with numerous small punctures; area of metothorax with very numerous vertical ridges; hind basitarsi broadened, rather hollowed on inner side; tegulæ piceous; wings dusky hyaline; stigma small, dark rufous, nervures piceous; second s. m. very large, receiving first r. n. a little beyond middle; b. n. falling a short distance short of t. m.; abdomen very finely punctured; stipites very broad; sagittæ divergent apically; hind margins of ventral abdominal segments with narrow dense pale hair-bands.

Habitat.—Two males, Matucana, Peru, June–July, 1913 (*Brues*).

Superficially, this is exactly like *Lonchopria inca*. Although the abdomen is not really banded, when worn it seems to be so, owing to the furfuraceous pubescence remaining in the apical depressions of the segments. The species belongs to the *C. lycii* group, and has some affinity with *C. peruvicus* Ckll., but is much larger, with longer malar space, etc. In Swenk's table of North American *Colletes* (1908) it falls closest to *C. intermixtus*.

ATTIDÆ OF THE YALE DOMINICA EXPEDITION.

BY ALEXANDER PETRUNKEVITCH,

NEW HAVEN, CONN.

Among the spiders collected by Professor H. W. Foote in Dominica were several jumping spiders which he sent for identification to Mr. G. W. Peckham. Mr. Peckham had identified them and found four new species when his work was cut short by death. Professor Foote then placed the specimens in my hands for description. In accordance with the desire of Mrs. Peckham, who was kind enough to defray the expenses of the drawings, these were made by Mr. J. H. Emerton.

1. *Commoris enoplognatha* Simon, 1902, Ann. Soc. Entom. Belgique, Vol. XLVI, p. 382. Hist. Nat. Araignées, 1903, Vol. II, p. 780, fig. 935. Plate XII, figs. 1-3.

Male.—Total length 6.8. Cephalothorax 3.0 long, 2.4 wide. Quadrangle much wider than long, slightly narrower behind than in front. Eyes of second row minute, situated half way between the ASE and PSE. Cephalic part shorter than thoracic. First femur considerably thickened. A brush of long black hair on the underside of femur, patella and tibia of first leg. A tuft of white hair on the inside of first patella, close to base. Copulatory apparatus as figured. Femur of palp with white, the other segments with black hair. Tibial apophysis thin and rather long. Hair on cephalothorax of three different colors, white, black and rusty brown.

2. *Sidusa dominicana* new species. Plate XII, figs. 4-5.

Female.—Total length 4.8. Cephalothorax 2.0 long, 1.8 wide. Quadrangle slightly wider in front than behind. First row, viewed from in front slightly curved upward. Side eyes equal in size, their diameter a trifle longer than half the diameter of AME. Eyes of second row midway between ASE and PSE. Sternum oval, anterior coxæ separated by the width of the lip, which is as wide as long. Legs 4312. Tibia of first and second leg with 3-3 long spines below and laterals; metatarsus with 2-2 below and laterals. Cephalothorax dark brown with a median yellow band extending from the anterior end of dorsal groove to posterior edge of cephalothorax. Side edges of cephalothorax black with a submarginal yellow band. Dorsal surface of abdomen yellow with two brown bands spotted with yellow. Legs yellow, with dark spots on femora, tibiæ and metatarsi. Epigynum as figured.

3. *Hasarius Peckhami* new species. Plate I, figs. 6-9.

3. *Hasarius peckhami* new species. Plate XII, figs. 6-9.

separated by width of lip, which is as long as wide. Clypeus very narrow. Quadrangle wider than long, shorter than half of the entire cephalothorax. Anterior row slightly recurved. Eyes of second row minute, nearer the ASE (in front of middle). Thoracic part with a stria. Superior margin of chelæ with two teeth. Carinula emarginate, bidentate. Fourth legs with spines. Legs 1423. First metatarsus much longer than tarsus. Spines on first tibia 3-3 below, inner row begins in middle, outer row at base. First metatarsus 2-2 below. Second tibia 3-3 below and 2-2 laterals, second metatarsus 2-2 below. First femur strongly and second femur slightly dilated. Femur of palp very long and curved, tibial apophysis short, spine-like. Copulatory apparatus as figured. General appearance in alcohol dark. Face with white scales. Cephalothorax with two broad white bands of white scales. White scales on legs and mandibles. Abdomen with two white narrow lateral lines uniting in front.

4. *Wala footei* (Peckham in litt.) new species. Plate XII, figs. 10-14.

Male.—Total length without mandibles 5.8. Cephalothorax 2.3 long, 2.0 wide. Chelæ long, with curved fang. Quadrangle considerably narrower than cephalothorax, parallel, wider than long. Eyes of the second row slightly in front of the middle. Cephalic part considerably shorter than thoracic. Sternum much longer than wide. Legs 1423, first leg considerably longer and heavier than the others. Spines on first and second tibia below 3-3 (first outside spine sitting $\frac{1}{4}$ from the base of the tibia, first inside spine $\frac{1}{2}$ from the base). First and second metatarsus 2-2 below. Black hair, thicker at end than at base, on underside of patella and femur at its distal end. Copulatory apparatus as figured. Tibial apophysis of palp straight, spine-like. Cephalothorax light brown with two white bands extending from the face backward almost to the posterior edge of the cephalothorax. Abdomen light brown with two narrow longitudinal white bands. Mandibles and legs II, III and IV light yellow. Legs of the first pair light brown. Tip of femur, entire patella and tibia and base of tarsus of palp black.

Female.—Total length 5.7. Cephalothorax 2.1 long, 1.8 wide. Legs 1423, first leg considerably longer and heavier than the others. Spines as in male. Black hair of the same type as in male on femur and patella, but smaller in number. Mandibles red brown, legs and palpi light yellow. Cephalothorax with two narrow longitudinal white bands and median V-shaped spots. Abdomen yellow with three median brown spots. Epigynum as figured.

5. *Corythalia peckhami* new species. Plate XII, figs. 15-20.

Male.—Total length 4.8. Legs 3412. A heavy brush of black hair on first, second and third patellæ and tibiæ and on second and third metatarsi. Spines on legs numerous. First and second tibia below 3-3 and 2-2 laterals, first and second metatarsus below 2-2 and 2-2 laterals. Quadrangle wider



Attidæ.

than long, very slightly narrower behind than in front. Cephalic part much shorter than thoracic. Copulatory apparatus as figured. Pedipalp covered with black hair except patella which is white with iridescent scales and hair. General color in alcohol almost black with green and red iridescence. Around the eyes long black hair and white iridescent scales. A marginal band of white scales on each side of cephalothorax. Abdomen with two iridescent spots.

Female.—Total length 7.0. Spines on legs as in male, but lateral spines on outside of first tibia lacking. No black brushes on legs. General appearance in alcohol considerably lighter than that of the male. Abdomen with lateral iridescent white bands, with two pairs of black spots on back and a pair of white iridescent spots between them. Epigynum as figured.

EXPLANATION OF PLATE XII.

Commoris enoplognatha Simon.

1. Chelæ of male.
2. Palpus of male from below.
3. Palpus of male from above.

Sidusa dominicana n. sp.

4. Dorsal view of female.
5. Epigynum.

Hasarius peckhami n. sp.

6. Dorsal view of male.
7. Chelæ of male.
8. Side view of male palpus.
9. Palpus of male from below.

Wala footei (Peckh. in litt.) n. sp.

10. Dorsal view of male.
11. Lip, maxillæ and chelæ of male.
12. Palpus of male from below.
13. Dorsal view of female.
14. Epigynum.

Corythalia peckhami n. sp.

15. Dorsal view of male.
16. Palpus of male, side view.
17. Palpus of male from below.
18. Dorsal view of female.
19. Chelæ of female.
20. Epigynum.

MISCELLANEOUS NOTES.

Balaninus quercus Horn.—This species, readily distinguished by the concave pygidium in the male sex, is the male of *B. rectus* Say, described by Say as having a beak longer than the body and straight nearly to the apex. The name *rectus* has been universally applied to the smaller chestnut weevil, but erroneously, as shown by Casey (Can. Ent., 1910). Specimens of *quercus* male and *rectus* female have been repeatedly taken in copulation by Mr. Wm. T. Davis, they are alike in form of body, color, and in all respects except length of beak and sexual characters, and unless associated as stated, each name will be represented by one sex only. *B. orthorhynchus* Chitt. seems to be based upon small specimens of the same species. *Balaninus algonquinus* Casey becomes, in consequence of the error by which *rectus* Say was applied to the smaller chestnut weevil, the earliest name for that species and our catalogue should read:

B. rectus Say (nec Horn, Blanchard, Hamilton, Chittenden, etc.).

quercus Horn (male).

orthorhynchus Chittenden.

B. algonquinus Casey.

rectus Horn, etc. (nec Say).

C. W. LENG.

Some Additions to the New Jersey List of Lepidoptera.—At the meeting of the New York Entomological Society held November 4, 1913, Dr. W. T. M. Forbes gave an account of our sugaring experiences at Lakehurst, N. J., on October 19, 1913, and mentioned *Leucania juncicola* Guenee and *Epiglaea pastillicans tremula* Harvey as additions to the New Jersey list (see this *Journal*, Vol. XXII, p. 77, March, 1914).

On October 9, 10, 11 and 12, 1914, Mr. Ernest Shoemaker and the writer sugared at Lakehurst, and secured a single *Heliophila subpunctata* Harvey. The New Jersey specimen has been compared with examples of *Heliophila subpunctata* collected by the writer in April, 1912, on the South Shore of Lake Okeechobee, Florida, and no difference can be discovered. *Xylina pexata* Grote was collected October 19, 1913, and again October 10, 1914, one on each occasion.

Among other desirable species taken by Mr. Shoemaker and the writer which are not additions to the list, are two specimens of *Agrotis bostoniensis* Grote, which is more common northward; *Chloridea virescens* Fab., only mentioned from Staten Island in the New Jersey list, and *Semiophora grisatra* Smith, the type locality of which is Lakehurst. This last named species was found on the trunks of pine trees and also came to sugar at night. *Xylina capax* Grote & Robinson was collected October 19, 1913, and again October 9 to 12, 1914, when excepting *Heliophila unipuncta*, it was the most common species at sugar. In the New Jersey list it is recorded under the name *Anytus capax*, and only from "Ramsey IX, 19 (Sleight)."

In October, 1913, we collected *Xylina fagina* Morrison, *Xylina thaxteri* Grote, *Xylina laticinerea* Grote, *Scopelosoma walkeri* Grote, *Scopelosoma sidus* Guenee and *Scopelosoma tristigmata* Grote, which we did not find in October, 1914.—WM. T. DAVIS.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF MAY 19, 1914.

A regular meeting of the New York Entomological Society was held on May 19, 1914, at 8.15 P. M., at Heim's Restaurant, President Raymond C. Osburn in the chair, with nineteen members present.

The meeting was preceded by an informal supper at 7 P. M. In calling the meeting to order, Dr. Osburn referred to the floral contribution from the garden of Mr. Joutel, who was unable to be present in person.

The Field Committee reported on the Field Meeting at Great Notch, N. J., and asked the wishes of the members regarding subsequent meetings.

After a general discussion of the subject it was voted to hold three meetings in the field, in which the Brooklyn Society should be invited to participate: Decoration Day at Wading River, L. I., July 4, at Pine Island, N. Y., Labor Day at a place to be selected on July 4.

On motion, Mr. Mutchler was authorized to act as librarian for the balance of the year.

Mr. Schaeffer exhibited "North American Species of *Onthophagus*" and spoke concerning them, saying in part that the so-called varieties of *O. janus* were not all properly placed, *substriatus* being in truth simply a color variation, but *subaneus* and *orpheus* quite distinct species. All the known species except *brevifrons* and *cribricollis* were shown, including several described by

Mr. Schaeffer himself and others added to our fauna by his investigations. Mr. Schaeffer referred particularly to a remarkable form from Lakehurst, with emarginate clypeus, agreeing in many characters with the description given for the Kansas and Texas species *cribricollis*, and asked that members having Lakehurst specimens should examine them carefully; also to a small, shining form of *pennsylvanicus* from Florida and Texas. He also mentioned the great differences in *Onthophagus* and other Coprinæ between the major and minor males in development of cephalic and thoracic protuberances, illustrated by a series of *Phanaeus difformis*.

Mr. Barber exhibited Belostomidæ from South America, determined by a Hungarian authority, and a series of *Lygaeus albulus* Distant, collected by Mr. Olsen at Yaphank, L. I., stating that this species, originally described from Mexico, had been found at widely separated localities, viz.: Florida and Woods Hole, Mass.

Mr. Dow exhibited the work on entomology of Thos. Mouffet, published in 1634, but evidently prepared for the press by some one else, since Mouffet died in 1580. Mr. Dow said the material on which the work was based seemed to have been gathered by Conrad Gessner in Germany and to have served for eleven or twelve editions by various hands, including Edward Wharton and Martin Lister, who left his manuscript to John Ray. The number of preceding authors cited was interesting and the notoriety of the work was sufficient to have caused Mouffet's name associated with invertebrate life to appear in nursery rhyme.

Dr. Osburn called attention to the accuracy with which the expanded pouch of the male sea horse, in which the eggs laid by the female are carried, was figured on one of the plates.

Mr. Davis exhibited *Donacia emarginata* from Lakehurst, N. J., taken by sweeping the palustral vegetation by the side of the ditches adjoining the railroad tracks; and, commenting upon Mr. Woodruff's recent discovery of the pupæ on roots of *Caltha palustris*, said this plant did not occur at Lakehurst, so the species must have other food plants as well.

Mr. Woodruff said he expected that it bred in skunk cabbage.

Mr. Leng showed photographs made by Mrs. Ellen Robertson Miller of *Donacia palmata*, its larvæ and their work on Yellow Water Lily.

Mr. Comstock showed three very different forms of the common little copper butterfly, *Chrysophanus hypophlæas* Bdv., collected and mounted by Mr. Hall, and commented on the recent duplication of the description of the form without spots, i. e., *obliterata* Scudder.

Mr. Schaeffer called attention to the long wet spring as being specially favorable to the development of melanic forms.

Mr. Mutchler exhibited *Metamasius sericeus* and *M. hemipterus*, quoting Champion's doubts as to their being distinct on account of similar male characters and giving in detail the known distribution of each, by which it appeared that the one was confined to South America, the Lesser Antilles and Porto Rico, while the other was found in Cuba and Jamaica. He also spoke of the food habits, boring in the trunks of moribund banana, and apparently as a

secondary matter attacking sugar cane, quoting several West Indian agricultural reports, in none of which did it, however, appear to be a serious pest.

Dr. Lutz gave details from his personal experience in Dominica and from the Cuban journey with Mr. Leng of its habits, stating that the banana trunks in which it normally feeds are very sappy and fibrous and that any physically similar vegetation as sugar cane or Bromeliads are therefore liable to attack. Dr. Lutz added that the gnawed fiber is finally gathered together for the pupal covering.

Speaking of the various names for Hispaniola, Dr. Lutz said that Haiti, while commonly used really covered only half the island, the other part being known as San Domingo, and that a confusion of records would result from using either exclusively; while Hispaniola was not only the older but the only proper name for the whole island.

Mr. Shoemaker exhibited *Platynus caudatus*, quoted as rare in spring in Ulke's List of Beetles of District of Columbia, and said he had personally found it rare on June 2d and missing in July, but it reappeared late in August and was plentiful in September along the banks of the Potomac above the Free Bridge. His captures resulted from free use of bottles baited with syrup.

Mr. Miner spoke of the distribution of the land snails of the genus *Cerion*, inhabiting Cuba, Haiti, Porto Rico, Bahamas and Florida Keys, entirely absent in Lesser Antilles, but found in Curaçao. The habit of these Mollusca is to live about 300 yards from the sea and to form local colonies which offer characteristic variations, so that the Cuban species is quite distinct from others. Distribution is necessarily a slow process and salt water becomes an impassible barrier except by the aid of floating wood. This distribution is interesting as confirming Dr. Britton's view that the regions in which the genus occurs constitute a unified province, separate from Jamaica, for instance, where the snails do not occur.

Mr. Schaeffer said it was prudent to check distribution records obtained from one group of organisms by similar records from other groups, giving instances from his experiences in Texas and Arizona of the different results deducible from comparisons in different families and orders.

Mr. Leng, referring to the possibly assumable elevation of the continental shelf on which rested the coral reefs of Cuba, Bahamas and Florida, pointed out that the same assumption had previously been made to explain the isolated Carolinian flora of the sandy areas about Bay St. George, Newfoundland.

Mr. Roberts spoke of the importance of the coxal file as an index of specific difference in *Laccophilus*, affording an absolutely certain means of separating species of great resemblance in color. Applying this test demonstrated that *L. proximus*, described by Say from Louisiana and Texas, occurs also in the Antilles, the *americanus* of Aubé (but not of Crotch), cited in Antillean lists being an absolute synonym.

Dr. Osburn exhibited *Tabanus zonalis* Kirby taken by Mr. Sleight in Bear Swamp, near Ramsey, N. J., May 28, 1911, saying that the specimen shared with one taken by Mr. Watson at Greenwood Lake the honor of establishing

the southernmost records for the species which is usually found in New England, Canada and northern North America.

He also showed specimens of *Criorhina verbosa* Harris personally captured after a dozen year's hunt, and an interesting series of *Pipiza albopilosa* Williston, new to the New Jersey List, caught May 10 about wet places under the Palisades, a locality reached by motor boat ferry from Dykeman Street station of the subway, and very desirable as a collecting ground. He said Johnson had put *femorialis* and *albopilosa* together, possibly correctly, since in the Palisades series of nine males (which sex in Diptera often emerges before the female) only five were pure *albopilosa*, while four showed abdominal spots approaching in varying degree the markings of *femorialis*, though none were the typical *femorialis* as shown in Canadian specimens received from Chagnon. These Syrphids were very rapid on the wing and were caught hovering over the bushes.

Mr. Roberts mentioned that the Ramsey specimens in Mr. Sleight's collection, supposed to be *Haliphus ruficollis*, proved to be uniformly *Haliphus blanchardi*.

Mr. Leng exhibited, at the request of the publisher, the first number of a new journal, "Microkosmos."

Society adjourned until first Tuesday in October.

MEETING OF OCTOBER 6, 1914.

A regular meeting of the New York Entomological Society was held on October 6, 1914, at 8.15 P. M., in the American Museum of Natural History, President Dr. Raymond C. Osburn in the chair, with seventeen members and two visitors, Mr. Bridgeman and Mr. Chas. T. Ramsden, of Guantanamo, Cuba, present.

Mr. Barber spoke of his visits to Porto Rico, stating that Mr. Watson and he had started from New York on July 4 and spent four weeks on the island, collecting insects of all orders at San Juan, Ponce, Mayaguez, Arecibo, Coamo Spring and Aibonito in the mountains of the interior, at which last named locality they found the best collecting. The season did not prove the best for collecting; April, May and June would have been better. He spoke of the great difference in the physical characteristics of the places visited and promised further details later.

Mr. Barber also spoke of his visits to Pine Island, N. Y., where early in the summer he found good collecting in and around the great swamps, and to Nebraska and Missouri, where towards the end of the summer it was too hot and dry for good results.

Mr. Davis spoke first of the Society's field day at Wading River, L. I., then of his trips to the summit of Whiteface Mountain, N. Y., with Mr. Shoemaker, and finally of the Catskill Mountains, N. Y., and Riverhead, L. I. At the last named place he found two beetles of interest, *Strategus antaeus* and *Cicindela abdominalis*, both known from the Pine Barrens of New Jersey. The first, popularly known as Ox-beetle, was first found by Mr. Schaeffer in

August, 1912; in 1913 only an elytron was found, but this year four were found within 200 or 300 feet of which only one was alive. The locality for these beetles is a sandy stretch towards Bald Hill. Of the *Cicindela*, a single specimen was found in 1913, but this year a number were found on a sandy road through the pines near the town, a little back from the river.

Mr. Davis added that he believed the New York records for *C. abdominalis* derived from specimens in the Luetgens Collection were erroneous, since Mr. Beyer, who gave them to Luetgens, had stated that he had collected the species in Florida only.

Mr. Sherman spoke of two weeks spent at Marquette, Mich., on Lake Superior, where he had collected 700 species of Coleoptera, or about 60 per cent. of the record catch of Hubbard and Schwarz, 1,100 species. As compared with his previous visit, the date, July 12, proved late for some of the rare species like *Anthophilax*, and showed a marked difference in the number of individuals of certain short-lived species. Three years ago, *Cephaloon lepturoides* was by far the most common species; this year its place was taken by *Buprestis fasciata*. Fifty species of Dytiscidæ were obtained in the swampy areas between the sand ridges bordering the lake, a much smaller number than would have been obtained in suitable localities near New York. Mr. Sherman said the beach collecting, which is the principal attraction at Lake Superior, depends on weather conditions; usually three days' land breeze and three days' lake breeze alternate, the beetles being washed up on the beach by the latter. He exhibited two interesting species, *Miscodera arctica* and *Nomius pygmaeus*, the latter being readily known by its peculiar odor, quite appreciable after immersion for weeks in alcohol.

Mr. Shoemaker spoke of his journey to Washington and the Adirondacks with Mr. Davis, and of recent visits to the Palisades where on September 13 and September 20 he had found specimens of *Sandalus niger* and *petrophya*.

Mr. Engelhardt spoke briefly of his visit to the Bahama Islands, New Providence, Abaco and Andros, where he obtained many photographs and insects, to be shown later in the season; and in more detail of his vacation in the eastern part of New York State, including Ithaca, Watkins Glen, Geneva, Rochester and the Letchworth State Park near Portage. He spoke particularly of the gratifying results of the influence of the Entomological Department of Cornell University on the farming industry along the shores of Lake Geneva, where in the extensive grape and peach orchards the operations of spraying and other remedies as taught at the University have become matters of routine; and of the natural beauties of the Letchworth Park, with its many waterfalls and defiles, enhanced by the preservation and reforestation of its 1,000 acres. At Ithaca Mr. Engelhardt collected *Mantis religiosa* in numbers at electric lights and in the meadowland and said the specimens are believed to be descended from egg masses exposed twelve years ago by Slingerland.

Dr. Osburn called attention to a specimen of *Eristalis tenax* attracted by the lights in the room and said it was perhaps as well that it could not join in describing its summer experiences.

Mr. Leng spoke of collecting in September at Huguenot Beach, Staten

Island, where many species of *Anthicus* were found in the sand, while Pselaphidæ were abundant under high tide bushes in the adjoining salt meadow; and at Ward's Point, Staten Island, where a number of species were obtained by pulling up the grasses and shrubs growing in the sand.

Dr. Lutz introduced Mr. Ramsden, who spoke of collecting insects in the eastern end of Cuba, stating that the best seasons were usually from April 15 to June 15, and from September 15 to November 15, the two rainy seasons, though in some years rains starting in February would bring good collecting earlier. Two or three days' rain is sufficient to start the insects and an interruption of dry windy weather will check them, good collecting being really a product of moisture rather than season. Mr. Ramsden closed by extending an invitation to entomologists to visit him at his sugar plantation at Guantanamo.

Mr. Dow spoke of finding *Phlegethontius cingulata* and *Colias eurytheme* in Brooklyn, and of his correspondence during the summer with several entomologists.

Mr. J. W. Angell spoke of his visit to Twin Lake, Conn., recommending it as a desirable locality, embracing lakes, forests and swamps of boreal character.

Mr. Engelhardt referred to the capture of a specimen of *Catocala herodias* at Wading River as an additional example of Pine Barren insects occurring on Long Island.

Mr. Davis said its food plant was *Quercus nana* and that it was therefore liable to occur elsewhere and in fact did. The larva, resembling a swelling on the bark, had been found on that tree and raised.

Mr. Wheat showed many photographs of the Bahamas and particularly of the long string of small keys among which he had cruised this summer. He said there were apparently very few insects, practically no mosquitoes or flies and only a few species of moths and butterflies.

MEETING OF OCTOBER 20, 1914.

A regular meeting of the New York Entomological Society was held October 20, 1914, at 8.15 P. M., in the American Museum of Natural History, Vice-President Barber in the chair, with seventeen members and one visitor, Dr. Robert T. Morris, of the Linnæan Society, present.

Mr. Leng read a paper on "Nut and Acorn Weevils," exhibiting his collection and that of Mr. Davis. He gave a résumé of the literature, especially praising the paper by Fred E. Brooks, contained in Bulletin 128 of the W. Va. Agl. Exp. Station published in 1910. In reviewing the synonymy, he agreed with Casey's views published in Can. Ent., 1910, by which *Balaninus rectus* Say is interpreted as the acorn weevil with a long straight beak in the female, but added that *B. quercus* Horn is evidently the male of the same species, as shown by specimens taken in copulation by Mr. Davis, as well as the study of the descriptions. Since the name *rectus* was previous to Casey's 1910 paper applied to the smaller chestnut weevil, it follows that the name *algonquinus*,

proposed by Casey, becomes the first for that species. Mr. Leng also pointed out that Say's description of *nasutus*, though brief, fits well the hazel weevil and probably therefore has priority over *obtusius* Blanchard.

In reference to the acorn weevils with short beaks in both sexes, the first name applied was shown to be *uniformis* Lecoute, probably inapplicable to eastern specimens on account of the type locality being Pacific Coast; the second was *confusor* Hamilton, which should therefore take precedence over all later names, which do not represent species strongly separated by positive characters.

Mr. Woodruff, commenting on the last statement, said that *baculi* Chittenden from its uniform sooty color was the most easily recognized of all short beaked species

Dr. Morris said that in his plantation near New York City, where he had under cultivation many species of domestic and imported chestnut trees, the chinquapins of three species seemed immune to fungus disease and weevils; it appeared possible on discussion that the apparent immunity from weevils might result from the nuts being gathered before the larvæ had matured.

Mr. Davis, Mr. Schaeffer and Dr. Love joined in the discussion, the latter recalling that the *Balaninus* adults were plentiful on the chinquapins in West Virginia when he was there with Mr. Leng.

Mr. Schaeffer spoke under the title "Notes on Coleoptera" of *Alaus canadensis* being distinguishable from *A. myops* by the antennæ being alike in both sexes as well as by the color and size, and of *A. sumianus* being distinguishable from *A. lusciosus* by the blackish color beneath, extending even to the legs and modified only by a few white spots; the standing of Leconte's *gorgops* would, however, require investigation before any change was made. Mr. Schaeffer also commented on *Chalcolepidius apacheanus* as probably distinct from *C. webbi* on account of the vestiture of the tarsi, color, etc., as pointed out by Champion. Three species of *Physonota* were also shown, *picticollis*, *alutacea* and *unipunctata*, the first, a Mexican species, was collected at Tucson, Ariz., by W. M. Mann. In connection with *alutacea*, Mr. Schaeffer recalled finding the larvæ at Brownsville, Texas, which are provided with appendages like some Thysanura and very lively. Another interesting exhibit was a variety of *Strategus julianus* from Douglas, Ariz., with the side horns of the thorax acute at apex and the clypeus more deeply triangularly emarginate at apex than in *julianus*. Specimens of *S. 4-foveata* from the West Indies and *S. anachoreta* from the Bahamas expedition of Mr. Engelhardt were also shown, and mention made of a specimen of the former labeled "Fla," but perhaps erroneously, in the Dietz Collection.

Mr. Schaeffer also mentioned the finding by Mr. Schott of a single specimen of the European *Calosoma sycophanta* near Prospect Park, and showed the drawings in color of the species of Cassidini by Mr. H. B. Judy, the artist of the Brooklyn Museum.

Mr. Sherman said that Mr. J. W. Angell had found in a brook at Twin Lakes, Conn., specimens of *Hydroporus semirufus* Lec. (*dimidiatus* G. & H.),

a species heretofore unknown east of Arkansas. He also reported the destruction of the Peekskill locality for *H. difformis*.

Mr. Sherman mentioned also receipt of a letter from Dr. E. C. Van Dyke, giving details of a proposed summer camp at Lake Tahoe, Cal., where Dr. Van Dyke would be in charge from June 15 to August 31, 1915.

Mr. Davis showed a letter from Mr. Wintersteiner, dated Vienna, August 27th, and said Mr. Dow had one dated September 15th, both indicating his prospective speedy return. Mr. Davis also showed Bulletin 141 of Minn. Agl. Exp. Sta., on the Acridiidae of Minnesota by M. P. Somes and said it indicated more species of grasshoppers in Minnesota than in New Jersey by 78 against 65, the excess being partly in the genera *Melanoplus* and *Arphia*. He also showed the Proc. Ac. Nat. Sci. Phila., containing a long paper by Henry Fox on Orthoptera.

Dr. Forbes spoke of his visit to Mt. Washington in July. Rain interfered seriously with collecting but there were some noteworthy captures, particularly that of the Arctic bear, *Hyphoraia parthenos*, by Mr. Emerton at the unusually low level of 1,000 feet. The Mt. Washington butterfly, *Chionobas semidea*, was also noted.

Mr. Leng showed photographs of *Donacia adults*, larvæ and cocoons, made by Mrs. Ellen Robertson Miller.

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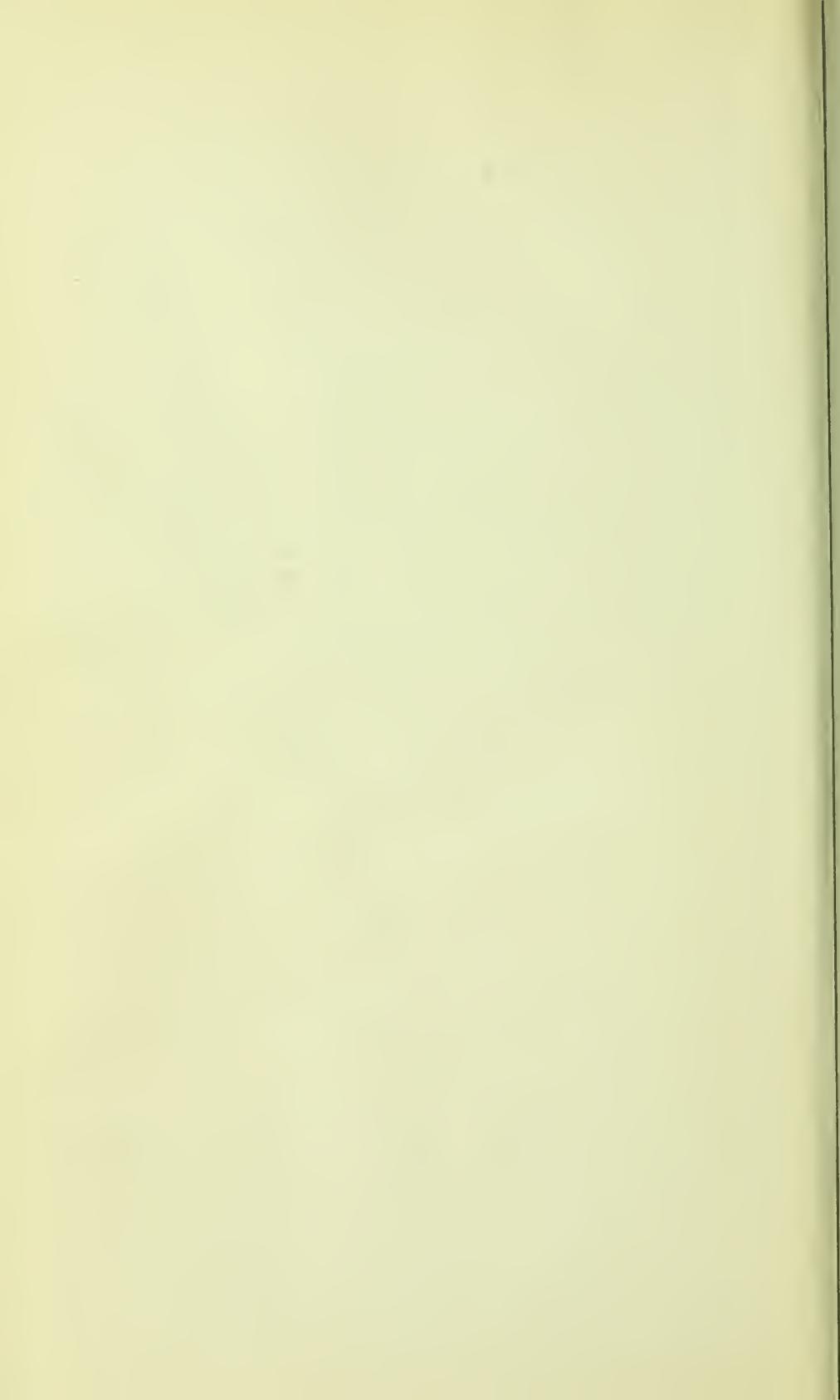
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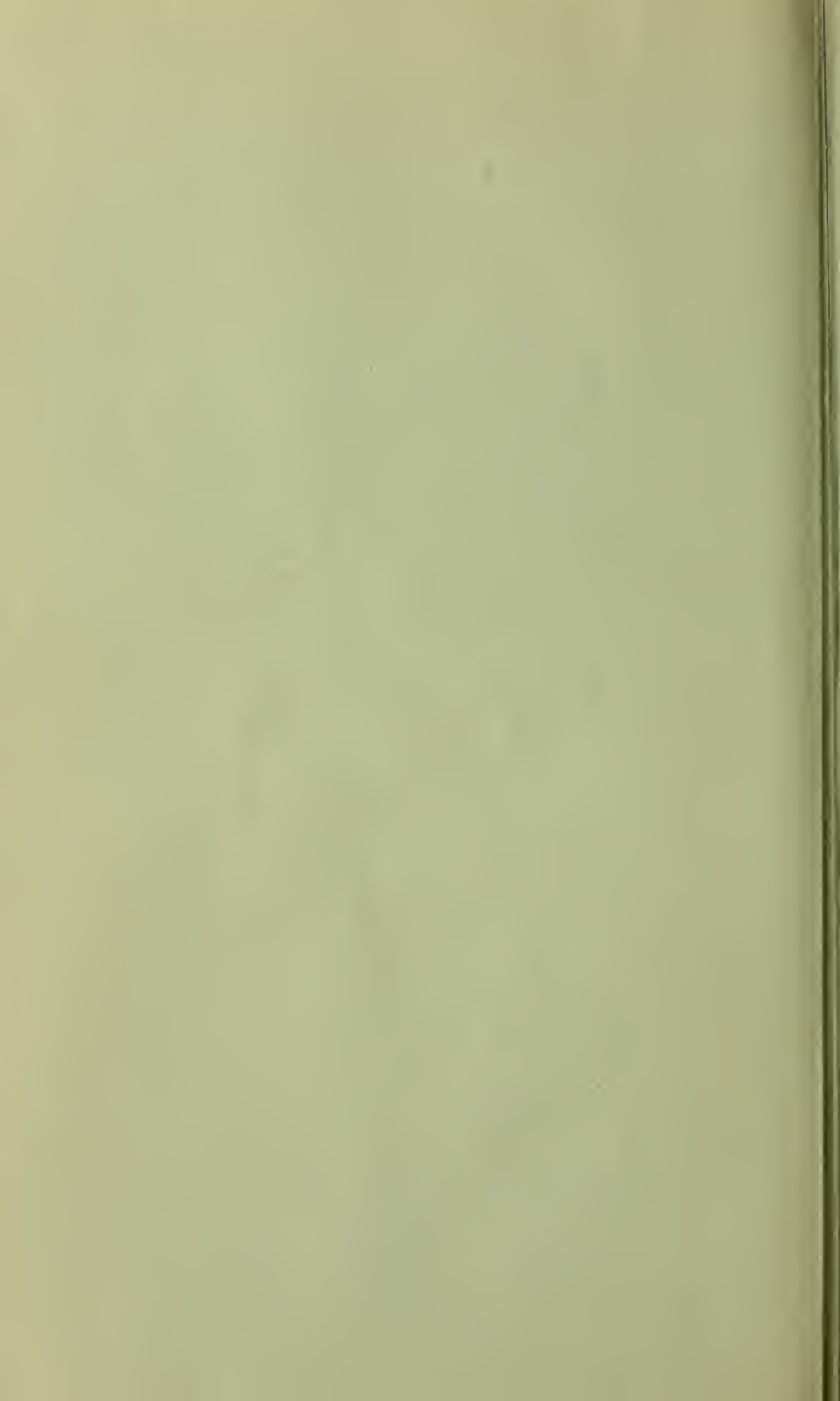
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